

**Cultural and Personal Factors Affecting Mobile Language Learning**  
—  
**An Investigative Approach**

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Using mobile phones for personal purposes becomes more and more important today. Therefore, the concept of mobile learning – a meaningful learning process happening via a mobile device – is gaining more attention in the area of mobile usage. As there are not many studies up to date which investigate the role of factors like personality or culture concerning mobile language learning and the perception of the user experience of a language learning application, this thesis aims at adding some clarification in this area of research. The WordDive Mobile Application was used as mobile language learning instrument in order to investigate important factors influencing mobile language learning behaviour. A total of 207 participants took part in this study. The participants first filled in a questionnaire to assess their cultural background, age, gender, and their WordDive Mobile Application usage. After that, the data was collected for a period of two weeks using data mining techniques. In the end, the participants completed another questionnaire about their user experience and personality. For data analysis, the participants were divided into groups according to their cultural background, age, gender, type of licence for the WordDive Mobile Application and personality. Results showed significant usage differences for all these grouping factors. The results of this thesis were to a large extent in line with results from comparable current research in the field of culture, personality and other factors affecting mobile language learning. However, certain differences raised questions which could be addressed in future research using the WordDive Mobile Application.

Key words and terms: mobile learning, mobile language learning application, culture, personality, age, gender, usage behaviour, data mining.

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# 1 Introduction

Mobile learning – that is, learning through the use of mobile technology on a handheld mobile device – is still a very fresh and new phenomenon (Tella, 2003). There is only little research available in the area of mobile learning even though mobile education and mobile learning services grow and gain wider attention (Tirri, 2003).

Depending on an individual's personality, he or she will be more or less likely to try out and use mobile learning services. In their article, Suki and Suki (2007) claim that persons who are “more adventurous, have greater empathy, are less dogmatic, are more intelligent, have higher aspirations in regard to education and occupations, and have a more favourable attitude towards science and technology” are more likely to actually engage in mobile learning (Suki & Suki, 2007, p.361). Additionally, these people are more self-confident than others towards their skills and knowledge about mobile services. People who search enjoyment and fun via mobile learning games are also found to retain and recollect the content of these games better. Thus, having an extravert, open and active personality type is advantageous both for the usage of and the benefit from mobile learning applications.

The cultural background of mobile technology users also affects their usage behaviour. Asian people tend to be more critical towards the usage of mobile services for language learning as their culture is more collectivistic. Mobile learning aims towards a very personal and thus individualistic learning process which might be more suitable for people from Western cultures. Western people are more analytic compared to Asian people and therefore might be more interested to engage in language learning via mobile applications in order to improve their individual skills. (Vatrapu & Suthers, 2007; Hsu, 2013)

Moreover, effects of gender on the intention and active usage of mobile services have been shown in previous research. Nysveen et al. (2005) have found that depending on one's gender, the intentions behind the usage of mobile chat applications differ. For females, it is more important that the services are enjoyable and also used by their peers. For males on the contrary, it matters more that these services have a certain practical aspect and allow them to express themselves. Regarding the usage of language learning mobile applications, the study by Harasty et al. (1997) on the size of language areas in the brains of males and females might play a significant role. According to their findings, those areas in the human brain which are related to language are larger in female than in male brains. This could influence the motivation and success of women compared to men when using a language learning service.

A person's age is another factor influencing the usage of mobile technology for learning. Younger people spend more of their leisure time using their mobile phones than older people do. The purpose of mobile technology usage also differs: Older people tend to use their mobile devices for work-related tasks whereas younger people's mobile usage is more based on entertainment and enjoyment. (Bianchi et al., 2005)

Concerning the motivation of an individual to do their best in their studies and reach the best possible outcome, it has been found that receiving monetary reward increases motivation. Therefore, there are motivational effects depending on the prospect of getting money for one's participation. People who receive payment for their actions may perform better and be more efficient than those who do not get any financial reward. This finding should not be limited to any specific task type and thus could play a role in the learning outcome of mobile language learning. (Krug et al., 2014)

Therefore, a clear need emerged to explore how factors like personality, culture, gender, age and monetary advantages influence the process of mobile learning. One step towards the clarification of this area of interest will be accomplished through this thesis.

The goal of this thesis is to investigate the influence of both the cultural and psychological factors on mobile language learning. Effects of age and gender will also be examined along the motivational effects of getting the language learning material for free or having to pay for it. A reduction of mobile learning to mobile language learning was necessary as investigating all areas of mobile learning would have reached beyond the scope of a Master's degree thesis. For language learning a number of mobile applications are available on the current market. One of these is the WordDive mobile application (WordDive Mobile, 2014). This application will be used as the mobile language learning system which the research of this thesis will be based upon.

The following research questions will be addressed in this thesis:

1. Is there any difference in the usage of the WordDive Mobile Application concerning the exercise duration, amount of exercise tries, speed of progress for the exercises, selected exercise mode, amount of exercises performed per day and amount of exercises completed per week for people with different cultural backgrounds, age groups, gender, licence types (free courses versus paid courses) and Big 5 personality factors.
2. Is there any difference in the subjective judgment of the User Experience of the WordDive Mobile Application:
  - a. between cultures
  - b. between genders
  - c. between age groups
  - d. between Big 5 personality factors

These research questions will be assessed in this thesis by first presenting a deeper insight into current research findings and literature. The WordDive Mobile Application will be introduced towards the end of the second chapter. After that, the methods of data collection will be explained. Chapter 4 provides an overview of the findings and how these were analysed. The results of this thesis show that all mobile usage variables – exercise duration, amount of exercise tries, speed of progress, exercise mode, amount of exercises performed per day and amount of exercises completed per week – produced statistically significant differences for people with different cultural backgrounds, age

groups, gender, licence types and Big 5 personality factors. Concerning the perceived user experience of the WordDive Mobile Application, statistically significant differences were found between cultures, genders, age groups and personality types. After a detailed presentation of these findings and their evaluation, the results of this thesis will be discussed in the light of existing research in the field of mobile language learning and a conclusion will be drawn.

## 2 Background and Literature Review

In today's world being mobile and available at all times has become very common. This availability is largely based on the growing progress in the development of mobile devices and technology (Hsu, 2013). Mobile devices embrace all sorts of handheld devices that can be carried with a person. This range of devices includes for example mobile phones, tablets, smartphones, and other small devices with a screen and a certain type of input functionality. Laptops, however, are not included in the group of mobile devices, following the example of a study on mobile language learning by Viberg and Grönlund (2012).

### 2.1 An Introduction to Language Learning

Language learning and language development have been investigated in the field of cognitive psychology. In the next paragraphs, an overview of language learning and the development of theories on language learning will be presented.

In her book, Brown (2008) states that the development of language involves both an understanding and the expression of language. In developmental psychology, language research has gone a long way from the behaviouristic theory of Skinner (1957) who claimed that operant conditioning can be applied to language learning. Skinner (1957) regarded language as a product of trial and error, reinforcement and the shaping of behaviour. In the process of language learning, reinforcement can come from the environment, for example the teacher smiling at the student who produced a correct word. The student then repeats the correct words and incorrect sounds or words are dismissed as the teacher will ignore these and not reinforce them. In the end, relying solely on trial and error in combination with reinforcement, a human learns language.

This behaviouristic theory of language learning has been criticized sharply by Noam Chomsky (1959). Chomsky stated that a theory relying only on what is visible on the outside is insufficient for describing linguistic interaction and characteristics. In his nativist theory, he claimed that all human beings have an innate ability for language learning called the LAD, Language Acquisition Device. This device enables learners to decode the language they hear and its rules, grammar and deeper structures. There is no evidence for the existence of such a tool in our human brains. However, the theory of Chomsky led to a rise in the field of cognitive psychology research of language (Barsalou, 2014).

Later in 1975, Bruner (1975) suggested that language is related to the social world we live in and the routines which we find in it. Language learning needs the context of language which is provided by society. However, this social context cannot offer any help for the learning of grammar and morphology.

All these theories added to our current understanding of language learning. The process of language learning involves three stages: encoding, storage and retrieval. Encoding is the phase of learning the material and being presented with it. The next step follows as a result of the first one. The material is stored in the memory system. After



that, the stored information in our memory system has to be accessed and recovered later when it is needed. This process is called retrieval. In order to actually learn something, the material has to reach our long-term storage system, also called long-term memory. (Eysenck & Keane, 2005)

This means, when learning a language, the learner first has to access the material and process it during the stage of encoding. After that, they need to store the new vocabulary in their memory system. Whenever the learners want to use the new language, they have to retrieve the information from their long-term memory and apply it in real life.

Having established an understanding of language learning, the current research situation in the field of online language learning will be described in the following paragraphs. In their work, Toffoli and Sockett (2015) investigated the perspective of university teachers on informal online learning methods for the English language. Thirty university professors of English participated in their study. The results showed that the professors were aware of the fact that their students practice English also in their leisure time using informal online language learning methods. Also, most professors agreed that online language learning will play a bigger role in future language learning. Students' abilities to understand rapid speech, use idioms and produce improved pronunciation are fostered by informal online language learning.

In another study, Yamada et al. (2014) examined the influence of personal interests on the retention of learnt vocabulary items. The outcome of their research showed that those students who learnt vocabulary connected to topics they were interested in produced significantly higher scores in vocabulary tests than those students who just learnt random topic lists. Therefore, the interest of the learner is important for their motivation both to learn the vocabulary lists and to keep from dropping out or discontinuing the learning process.

Butler et al. (2014) conducted a study on the effects of online games for language learning. They found that after a certain age, children play fewer games. As a possible explanation they stated that the behaviour and attitudes of children change around the age of 12 when children enter puberty. No gender differences could be found for the usage of language learning online games. This might be due to the fact that games for language learning are usually designed in a gender neutral way to attract learners of both gender groups. The young gamers rated such online language learning games as good games if they involved multiple players, had some amount of cognitive challenge, evoked curiosity and offered control to the player.

All these studies offer insight into the role of online language learning and its effect on teachers, students and learning outcomes. In the next section, the phenomenon of e-learning or online learning will be defined and the process of data mining and its application will be addressed.

## 2.2 E-Learning and Data Mining

People use their mobile phones throughout the day. In fact, mobile phones or smartphones are not simply mobile devices anymore: They are a means of expressing one's identity and personality and thus have become an important feature of a person's life. (Traxler, 2010)

Given this trend, it is not surprising to see how mobile devices also start to have a growing impact on the field of education and learning through a phenomenon called mobile learning. Martin and Ertzberger (2013, p.77) define mobile learning as "learning that occurs when learners have access to information anytime and anywhere via mobile technologies to perform authentic activities in the context of their learning".

However, this is only one characterization of the term mobile learning. Other definitions have been issued for example by Sharples, Taylor and Vavoula (2007) who have stated that mobile learning is context-independent learning through interactive technologies or by Kukulska-Hulme et al. (2011) who define mobile learning as an autonomic process which is personal, pervasive, informal and spontaneous.

All of these definitions come to the same conclusion. Mobile learning is meaningful learning which happens anytime and anywhere via the use of mobile devices. This definition will also be the basis of the research for this thesis.

Having established a definition of mobile or e-learning, another important technological concept has to be introduced: data mining. Trying to evaluate large volumes of mobile data and to find interesting patterns in that mobile usage data is a method called data mining. (Goh & Tanir, 2004)

It may be necessary to install special software on the user's mobile device in order to collect the data needed for a certain research project. For example, Do and Gatica-Perez (2010) performed an evaluation of mobile usage patterns through the mobile application data of 11 users continuously over several months. They were able to identify patterns of mobile usage for five different applications – voice, SMS, internet, camera and gallery – based on the time of the day, the duration and the number of uses per day and time. For instance, certain types of applications aiming at communication were used more during the evening while others were used more during the morning or afternoon. Their analysis of usage patterns inspired the scope of usage analysis of the data of this thesis.

Another example of data mining techniques used to retrieve patterns of mobile application usage is a study conducted by Verkasalo et al. (2010). In their study, the smartphones of the participants were equipped with special software in order to get an insight into people's mobile application usage. Behavioural log data was gathered over a period of two months per user. The received data was divided into three categories of services: internet access for browsing web content, mapping services and games.

There are several factors affecting language learning in combination with the usage of mobile technology. These factors will be illustrated and explained in the following sections.

## **2.3 Factors Influencing Language Learning and Technology Usage**

The process of learning can be divided into formal and informal learning. Formal learning includes all types of intentional, planned and often class-based learning like it happens for example at school or in a language learning course. Informal learning on the other hand contains all sorts of learning that happens spontaneously without any classroom situation and it is completely learner-driven. (Terras & Ramsay, 2012)

Mobile learning combines both types of learning as it can happen in a scheduled and intentional way as well as in a spontaneous manner. It adds a certain amount of control to the learners themselves (Rodríguez-Arancón, Arús & Calle, 2013).

In the following paragraphs, several aspects which have an impact on learning and mobile usage behavior will be described and discussed more closely.

### **2.3.1 Psychology: Personality and the Big Five**

One popular personality theory is the *Big Five* or *five-factor personality theory* (Goldberg, 1990; McCrae & John, 1992) even though it has not reached universal acceptance as such (Block, 1995). According to McCrae et al. (2013), this theory builds upon the assumption that every individual's personality can be subdivided into five different categories or bipolar factors: 1) *Openness to Experiences*, 2) *Conscientiousness*, 3) *Extraversion*, 4) *Agreeableness*, and 5) *Neuroticism*. These five categories are further subdivided into finer facets and traits. The Big Five have been shown to be able to describe the personality of a person.

The factor *Openness to Experience* portrays a person's range of interests and imagination. The higher a person scores on this factor the more creative and active this person is. *Conscientiousness* is defined as the level of self-discipline, punctuality and ambition a person has. High scores show that the person is very organized and striving. The third factor called *Extraversion* represents how sociable, talkative and optimistic a person is. Higher scores on this factor indicate higher levels of activity and interpersonal interactions. (Costa & McCrae, 1992)

In their study, Augner and Hacker (2012) found that young adults who are more extravert and emotionally unstable tend to use their mobile or smartphones in an unhealthy, addictive way. This problematic phone use resulted in high bills or the usage of the mobile phones during class or in other situations where it should not be used like when driving a car.

The factor *Agreeableness* represents the trusting and compliant nature of a person. If someone scores high on this factor, he or she is rather modest and altruistic. Last, *Neuroticism* has been defined as describing a person's emotional stability. Higher scores on this factor show that a person is less stable and relaxed. (Costa et al., 1992)

The questionnaire to assess this model contains altogether 300 items (Pervin, 2003). In order to reach higher response rates a shorter questionnaire to assess the Big Five would be useful. For this purpose, Gosling et al. (2003) developed the Ten Item Personality Inventory (TIPI). This questionnaire contains only ten items and for each item, the user has to select a value on a seven-point scale depicting his or her level of agreement (see Appendix D). The authors conducted altogether three different tests in which they evaluated the TIPI further. In all these tests, the results from the TIPI and the Big Five inventory were compared for validity, test-retest reliability and the correlation with other external measures assessing the participants' attitudes and habits. The results showed that the correlation of each TIPI factor with the original Big-Five inventory was highly significant ( $p < .01$ ). For the test-retest reliability the received correlations between the first TIPI and the second one which was filled in 6 weeks later were substantial with a mean correlation of  $r = .72$ . Furthermore, the correlations with other external measures showed the same patterns as the Big Five inventory correlations with these external measures. For every factor of the Big 5 model there are exactly two composites: one being on the positive side of the factor and the other one on the negative side. The completion of the TIPI takes about one minute and is thus very quick.

Chittaranjan et al. (2013) used the TIPI in their study and found that the Big Five personality factors (McCrae et al., 1992) played a role in the mobile usage behaviour of their participants. Extraverts had a higher number of phone calls and also spent more time talking on the phone. For Agreeableness they identified a different effect for men and women on their respective mobile behaviour. More agreeable women received a higher number of phone calls, whereas more agreeable men interacted with a larger number of unique contacts. Participants with higher scores on Conscientiousness would use professional mail applications more often, contact only a smaller group of people and refrain from using entertaining applications. Thus, people scoring higher on Conscientiousness also behaved in a more professional and structured way with their mobile phones. Lower scores on Neuroticism were connected to a larger number of received text messages which would be expected from people who are emotionally more stable and therefore able to keep up their relationships with their friends. Participants who reached higher scores on Openness used apps for entertaining purposes more frequently. This finding is also in line with the theoretical background of the factor Openness considering that people who are more open for new experiences want to reach out into the internet to find these experiences.

The above-mentioned research proved the Ten Item Personality Inventory (Gosling et al., 2003) to be a valid and reliable instrument for classifying the personality of a person through the Big Five personality factors in a rather compact and time-saving manner. Thus, the TIPI will be applied in the research for this thesis.

### **2.3.2 Age and Gender**

Additional factors influencing people's ways of interacting with their mobile phone applications are their age and gender. Obviously, older people will have more difficulties using a smartphone alone for the reason of its delicacy and rather small size. The older a

person is the less self-centred and the more collectivistic they become (Viberg et al., 2013). Therefore, older people might spend less time on their mobile phones. On the other hand, one could argue that older people should have more time to use mobile learning applications on their phones as they do not need to work anymore and thus have more leisure time at hand.

Considering the amount of mobile phone usage, Bianchi and Phillips (2005) found that young people have a higher risk of getting addicted to mobile phone usage. This was explained by the fact that younger people have a stronger connection and sense for technology than older persons do as young people are more familiar technology. In addition, older people used their mobile phones more for professional and business reasons than younger people did and therefore did not spend much of their leisure time using their phones. Consequently, the two factors – purpose of usage and engagement with technology – seem to be different for people of different ages.

Depending on the gender of a person, smartphone usage patterns and purposes differ (Chittaranjan et al., 2013). In their study on mobile chat services, Nysveen et al. (2005) found that male participants re-used a particular service only if it was also useful for their professional or private life. For female participants this type of prerequisite for future usage could not be identified.

Viberg and Grönlund (2013) found that gender influences the way people approach mobile learning. In their study, female participants were more positive towards the usage of mobile devices for language learning than were male participants. Moreover, they could identify gender as a strong predictor of the learners' attitude towards mobile language learning. In addition, age was found to influence learners' opinions about mobile learning so that younger people put an emphasis on individuality of the learning material and progress.

According to all these findings, young people are using their mobile phones more frequently and for entertainment purposes. Older people on the contrary use their phones largely in a professional context. Age also matters in the way learners perceive mobile learning. Gender seems to play a role in the attitudes towards mobile usage as women tend to be more positive and show a less work-related usage than men. Additionally, the learner's age influences the attitude towards mobile language learning.

In the next subsection, the terms user experience and usability will be explained and a selection of research in this area will be presented.

### **2.3.3 User Experience and Usability**

User Experience is defined as “a person's perceptions and responses that result from the use and/or anticipated use of a product, system or service.” (ISO FDIS 9241-210). Thus, whenever a person interacts with a product or service, there will be a certain reaction evoked in the person which reflects the quality of this interaction process.

Usability is defined in the ISO (International Standards Organization) standard 9241-11 as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” In this definition, the term *effectiveness* describes the level of completeness and accuracy with which a goal was achieved, in other words the task completion. *Efficiency* is the time needed to complete a task. The term *satisfaction* reflects how pleased the user is with the use of a system. (Nielsen, 1993)

In their study, Verkasalo et al. (2010) found that if a service was harder to understand and use, the users felt less in control of their actions. Users started to feel uncomfortable and unable to use the service in a correct way. In the same way, the perceived usability of the service also declined and the users were enjoying the usage of the service less. Different intentions guided the usage of the individual applications. Map services and mobile internet had a more objective and professional usage motivation whereas games were used in a more hedonistic way. The authors also found that the way users perceive the usefulness and enjoyment of a service directly influences their intention for future usage or non-usage of that particular service. Therefore, it is important that a service is both easy to use and enjoyable in order to guarantee future usage and acceptance.

Hsu (2014) examined the opinion and attitude on mobile learning of participants from different cultural backgrounds. The results showed that there is a difference in the perception of mobile language learning across cultures. Japanese participants did not value mobile devices and applications for language learning as their culture teaches them respect of their teachers who consequently cannot be replaced by technology. Asian students also put a greater emphasis on the usefulness of the system. European participants, however, were more interested in the application being fun to use.

One tool to measure the user experience and usability in one assessment was developed by Laugwitz, Held and Schrepp in 2008 and is called the *User Experience Questionnaire* (UEQ). Here, both the user-rated quality of a product and its attractiveness are evaluated. The UEQ was created in a series of empirical tests and procedures. First, a group of usability experts was instructed to produce a list of items related to usability and user experience. This first step resulted in an item pool of 229 terms which was reduced to a collection of 80 items after expert review. This set of items was put into a list with a seven point semantic differential scale. Then the item pairs were tested in a series of six different tests with altogether 153 participants working on two different versions of the developed questionnaire combined with different evaluation tasks. In order to further reduce the number of items, the item pool was subdivided into two different sets, one containing 14 emotional items and the other containing the rest of the 66 items. A factor analysis returned the factor attractiveness to explain 60% of the data variance. Out of these 14 items, six items were selected. The same procedure was applied to the second subset which resulted in five different factors which explained 53% of the data variance. These five factors were *perspicuity* (i.e. comprehensibility and clarity), *dependability*, *efficiency*, *novelty* and *stimulation*. For each of these five factors four items were selected

for the questionnaire. For the creation of the final questionnaire the item pairs were randomized both in polarity and order on a seven point scale. This version of the UEQ was then tested in two different validation studies which both resulted in satisfactory levels of reliability and validity. (Laugwitz, Held & Schrepp, 2008)

The User Experience Questionnaire was selected as a tool for measuring users' levels of hedonistic satisfaction as well as their rating of the product quality and usability. Other than questionnaires such as the AttrakDiff (Hassenzahl, Burmester & Koller, 2003), which focus more on one side of the users' opinion about a product, the User Experience Questionnaire tries to cover both the user experience and usability. (Laugwitz et al., 2008)

Despite their subjective nature, self-ratings are a reliable method of evaluation. For example, the level of agreement between the ratings of significant others and self-ratings have been shown to be far higher than the agreement between stranger's ratings and self-ratings. Therefore, one can assume that self-ratings depict a person's actual self and behaviour and are not just the result of people's wishful thinking about themselves (Pervin, 2003).

Another factor influencing language learning and the usage of technology to support the learning process is the cultural background of the learner. In the following subsection, the influence and importance of culture in language learning in general as well as in combination with mobile language learning tools will be described.

#### **2.3.4 Cultural Impacts on Language Learning**

The concept of culture is not an easy one to define. In 1952 there were already 152 different definitions of the term culture to be found. Culture reflects the beliefs, habits, values, education, traditions and language of a certain group. A group member needs to know its culture in order to be able to fully live in that group and participate in various sorts of everyday life. For example, a person needs to know how to dance, drive a car or go to the supermarket. Knowing how to behave in certain situations or how to talk also depends on a person's culture. (Riley, 2007)

One striking cultural difference in learning in general was described by Li (2005). This difference lies in the understanding of learning and it manifests between Western and Eastern cultures. Li (2005) established her theory examining European American and Chinese college students, both middle-class. Western students showed that their understanding of learning is based on the mind whereas Eastern students' beliefs were based on virtues. The mind orientation leads to a focus on mental functions, personal skills and individual achievement in learning. Westerners are expected to be active learners, reach out and question given facts in order to learn. The goal of learning is to reach an understanding or expertise of a certain topic or field. When failing, Western students felt disappointed and when succeeding they were proud. The Eastern virtue-based learning takes into account the learner as a whole and aims at perfection of the learner in a moral and social way. It relies on persistence and concentration. When Eastern students fail, they feel ashamed both for themselves as learners and for their teachers and mentors. This shame is in turn a motivation for the learners to aim at further perfection of

themselves. After success, Chinese students would want to keep on working on their self-perfection and thus remain humble about the victory.

A review by Egmond et al. (2013) supports this view on the meaning of learning for Asian and Western cultures. It is stated that the philosophical traditions of the West have formed their attitudes and expectations towards learning to be focused on the cognitive aspects. The Eastern culture is based on virtues like humbleness and collectivism which has led their position on learning to be centred around the moral dimension more than the cognitive one.

In another study, Hsu (2013) found that culture plays a role also in language learners' attitude towards the technological affordances, applicability and constructivism of a mobile assistance program for English language learning. 45 participants from seven different countries or areas were examined. The results of this study show that people from different cultures had different opinions on the technological affordances of mobile assisted language learning. Asian and especially Japanese participants gave the lowest ratings. In terms of applicability of mobile language learning the results were homogenously positive for all cultures. For the factor of constructivism and innovation, attitudes differed among cultures in a way that Japanese ratings were again more critical. Altogether, Asian and Western participants produced different results and had different preferences regarding their language learning. The fact that in Asian cultures the group or collectivistic goal is more relevant may play a role in the evaluation and attitude towards the use of mobile devices for language learning (Pervin, 2003).

Having introduced different factors, definitions and viewpoints on online language learning, the focus will now shift towards a tool for online language learning – WordDive. In the paragraphs below, the company WordDive Oy and its service will be introduced and the usage of the WordDive Mobile Application will be presented.

## **2.4 WordDive Oy**

As a service which combines mobile learning as well as its psychological and personal functions, WordDive will be the mobile language learning service on which this research is based. Because it is rather easy to use and learn, the service of WordDive has been able to attract more and more customers since its foundation in 2009. Currently, WordDive supports people's language learning in more than 120 countries spread across North and South America, Europe, Africa and Asia. The company itself is situated in the city of Tampere, Finland (WordDive, 2014).

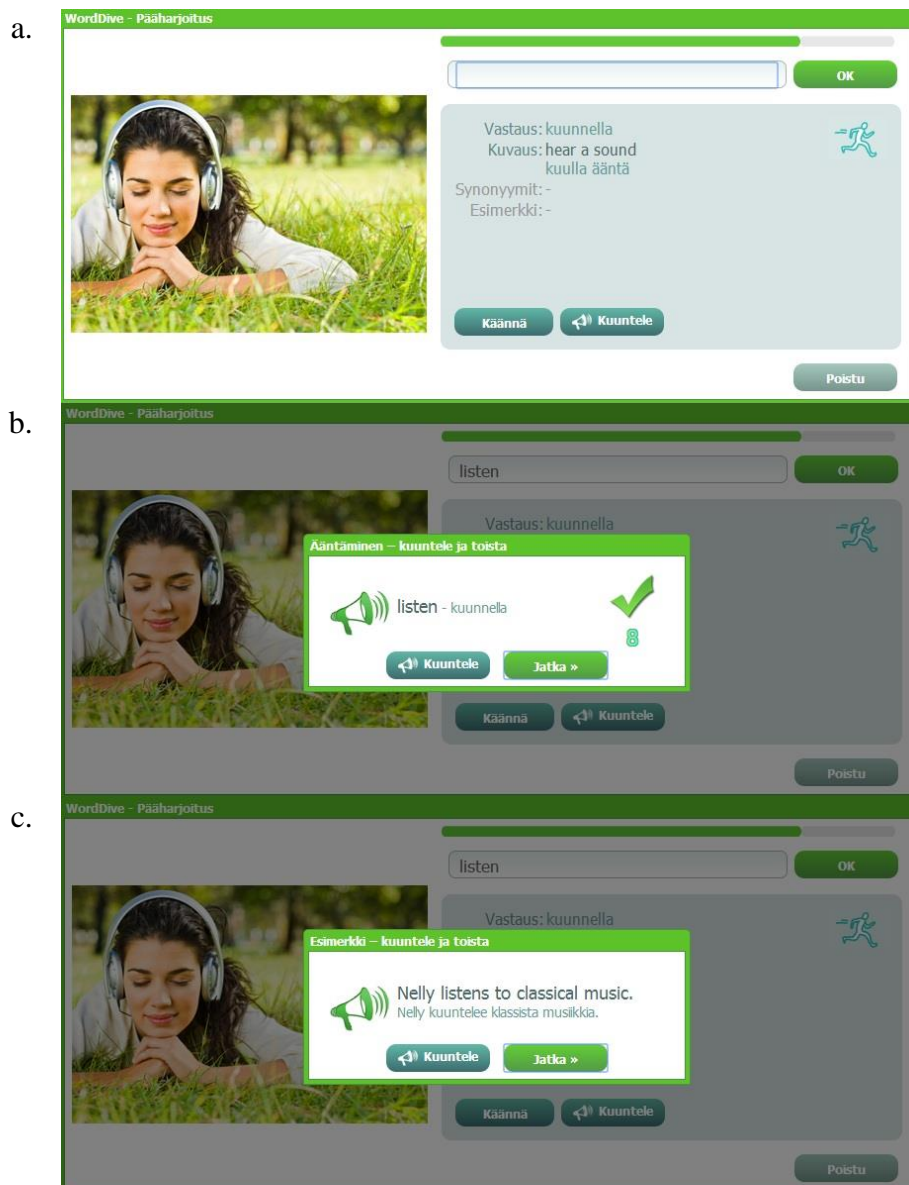
### **2.4.1 Language Learning with WordDive**

There is both an online, web-based version of WordDive which can be accessed via computer or laptop and a mobile version which currently works on all iOS devices. Devices running iOS were selected because it is a popular mobile phone operating system. As an example, the iPhone makes up 48% of smartphones used in the USA and is thus a widely accepted mobile device (Tazeau, 2012). Version 1.4 of the WordDive Mobile Application was released on September 16<sup>th</sup>, 2014, including major changes to the user



interface and an improved fluency of the application. As the version number indicates, the application is still rather young and no research has been carried out so far focusing on this particular mobile application. Thus, this thesis functions as pioneer work on the impacts and factors of importance for the WordDive Mobile Application.

WordDive works without any additional paper-form material. The language learner solely relies on his or her smartphone, tablet or computer. The program provides the user with a picture to hint the vocabulary item in question, a description of the vocabulary item and – if available – a synonym of the item. This information is provided both in the new language to be learnt and in the learner's selected translation language (see figure 1).



**Figure 1.** The web-based browser version of WordDive in the Main Exercise mode (WordDive, 2014).

- The first vocabulary item screen with the hints and insertion box.
- The second screen with the audio of the vocabulary item.
- The third screen with the example sentence for the vocabulary item.

Additionally, the user can listen to the vocabulary item if in doubt. After inserting the correct vocabulary item into the program, it will automatically play the item aloud and also provide an example sentence so the learner can see the use in context. The example sentence is also automatically played aloud to the learner. The learner is supposed to repeat these audio outputs in order to acquire the correct pronunciation and ease the memorization process. Therefore, learning with WordDive works using multiple modalities: seeing, listening, writing and speaking (WordDive, 2014).

In their study, Agca and Özdemir (2013) found that the involvement of mobile devices in second language learning makes the learning more interesting and attractive for the students. Moreover, the connection of the vocabulary text with a picture related to the word makes vocabulary learning more effective and helps to learn a word permanently (Agca & Özdemir, 2013). A limitation of their study was the material's connection to a study book. This places a certain boundary on the vocabulary learning which is overcome by WordDive as no other additional material is needed besides the mobile application or browser version of WordDive.

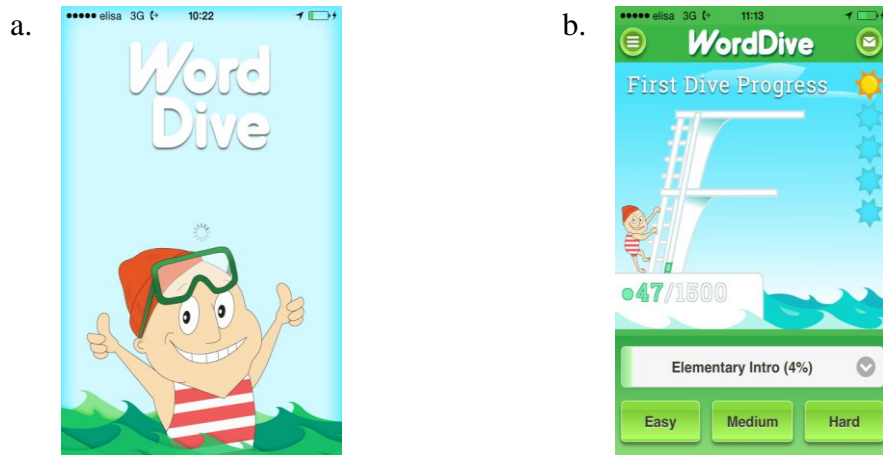
The mobile application of WordDive provides the basis of the research for this thesis. Therefore, in the following subsection its functionalities and modes of operation will be described in detail.

#### **2.4.2 The WordDive Mobile Application**

The first version of the WordDive Mobile Application was launched in autumn 2013. Since then, there have been several updates and modifications made to the application such as widening the range of exercise modes and study languages available. For the data collection of this study, version 1.4 of the WordDive Application was used. (WordDive, 2014; iTunes, 2014)

This version includes access to nine of the 11 languages WordDive provides in its browser version. These languages are English, German, Spanish, French, Italian, Finnish, Swedish, Estonian and Russian. The users can choose either only one or more of these languages for studying with the application. Whereas the download of the application itself is free of charge, the full courses have to be paid for. Using the WordDive Mobile Application users are free to decide when and where they want to study and also install it on several mobile devices running iOS. When the user has logged in, the application will remember where the user had left last time and provide him or her with the consecutive exercises.

After having logged in to the application, the users can select the exercise mode from the home screen (see figure 2).



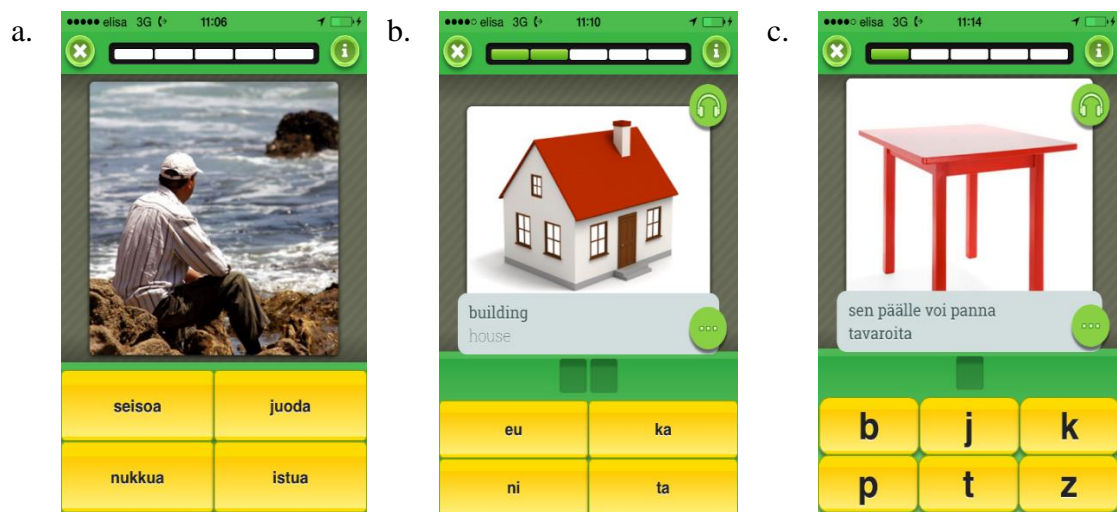
**Figure 2.** WordDive Mobile Application: Welcome screen (a) and Home screen (b) including exercise selection. (WordDive Mobile, 2014)

In the home screen, the application informs the user of several study-related parameters. On the right side there are suns indicating the scheduled amount of practice days per week the users have either set for themselves or the programme default. The grey suns show the planned days and the colourful ones the amount of days the user actually has practiced already within one week. This way, the students can easily keep track of their weekly goals. The points at the bottom of the jumping tower follow the same pattern: the grey number shows the amount of points the users try to achieve per week and the green number represents the actual amount reached at the moment. Thus, users can track their study progress for each day or even each session in real time. The jumping tower picture itself provides some gamification as Mikko, the icon of WordDive which can be found throughout the programme, climbs the jumping tower according to the progress the user makes and – if a successful week was achieved – jumps off that tower in celebration of the student's efforts. A short video shows this leap and Mikko's triumph.

Below the jumping tower and points, there is a dropdown bar which displays the language course the user is studying at the moment. The progress he or she has made in that specific course is indicated in parentheses behind the course title as a percent value of completion and also by the green filling of the dropdown menu adding the functionality of a progress bar. The suns, points, the degree of green filling of the dropdown menu and the percent value grant the learner a quick and efficient overview of his or her current studies. Using the dropdown menu bar, the user can switch courses or even languages with one tap. Three buttons indicating three different exercise modes can be found beneath the dropdown bar. These three study modes are the *Easy*, *Medium* and *Hard Mode*. As the titles suggest, the difficulty levels of the modes is rising from easy to hard and the student can freely select a mode or use them in turn depending on his or her level of knowledge in a specific language.

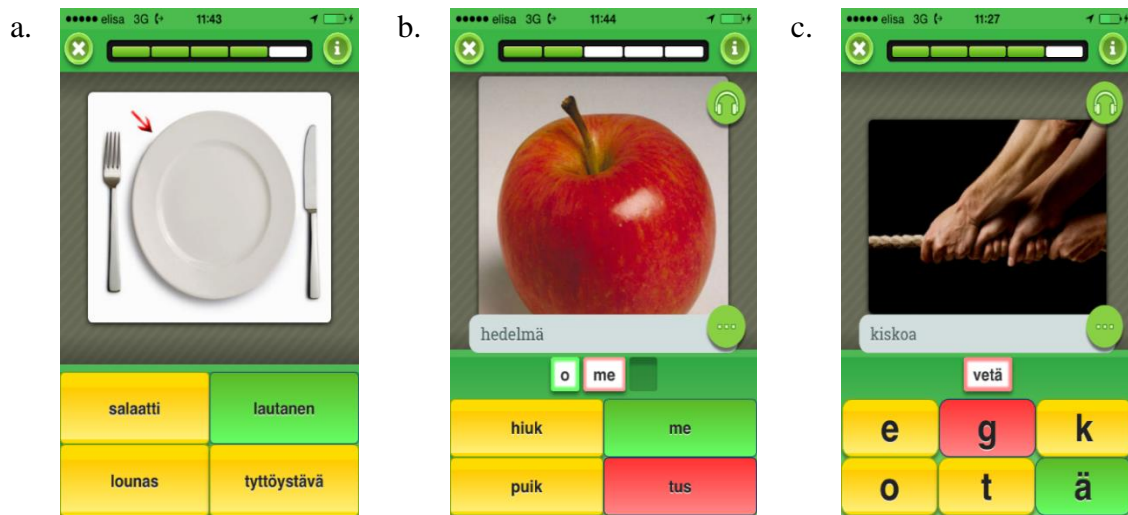
The Easy Mode (see figure 3a) consists of a picture of the study item in question and four alternatives of expressions in the study language. One of the four is the correct answer. The Medium Mode (figure 3b) presents the user with a picture of the study item,

a description and if possible also a synonym of the study item. Additionally, the learner has the chance to listen to the correct solution by tapping the headphone symbol on the top right corner of the study item picture or to translate the description, synonym and also the target word itself into his or her translation language via a button at the right side of the bar containing the description and synonym in the target language. Again, there are four answer alternatives to choose from. However, these alternatives do not consist of whole words or expressions but only of parts of words (syllables). The user has to select the correct syllable for the targeted study item. On top of the four answer alternatives, there are answer boxes indicating the amount of syllables the study item in question consists of. The Hard Mode as to be seen in figure 3c consists of the same elements as the Medium Mode. The only difference is that in the Hard Mode the learner has to select single letters or characters of the targeted study item and thus type the word character-by-character. The answer boxes now indicate the number of words the study item consists of.



**Figure 3.** WordDive Mobile Application in the Easy Mode (a), Medium Mode (b) and Hard Mode (c). (WordDive Mobile, 2014)

It is obvious that the learner cannot always know the correct answer, even after listening to it or considering its translation and description. Therefore, the application has to indicate if the inserted answer or part of the answer was correct or not. This is done by highlighting the tapped button in the intuitive colours for right and wrong, green and red. If the given answer was correct, the tapped button will turn green (see figure 4a). In case the inserted answer or part of the answer was wrong, the application will highlight the incorrectly tapped button red and the correct one green to show the learner what the correct solution would have been. This highlighting lasts only a short moment in order to keep the flow of exercising uninterrupted. The correct answer is then inserted into the answer box and the box is framed red to remind the user that the answer they gave was incorrect. Accordingly, the answer box of a correctly inserted answer is framed green (see figure 4b).



**Figure 4.** Indication of a correct (a) or incorrect answer (b,c) for the three different modes of the WordDive Mobile Application. (WordDive Mobile, 2014)

In the Hard Mode, typing the wrong character will flash the incorrect character button red and the correct one green for a short time. Additionally, the answer field for the whole word will be framed red in order to indicate that the last inserted character was not correct (see figure 4c).

For each answer, the user gets points depending on the correctness of the answer and the usage of additional hints like the listening function. The maximum amount of points is eight for a correct answer. For an incorrect answer, the user gets no points. For a correct answer after having listened to it, the learner receives six points. If the user listened to the answer but then still made a mistake in one of the answer parts, they get two points. This only applies for the Medium and Hard Mode. Bonus points are awarded for fast learners who know the answer without any hints at the first try. An overview of the different answer levels and their meanings as well as the symbols used to indicate these levels to the user can be seen in table 1.

**Table 1.** Different answer levels, answer level indicators and their meanings for the point system of WordDive (WordDive, 2014).

Icon	Meaning	Points
	Fully Correct. No mistakes and no help or hints used to answer.	8 + bonus
	Almost Correct. Minor mistakes in the answer, such as a wrong accent.	6 + bonus
	Correct by Listening. Fully or almost correct answer after having listened to it.	3
	Good Try. Mostly correct answer that suits the situation but is not the intended study item.	2
	Incorrect. Answer with major mistakes or not fitting the situation.	0



In case a user learns very fast, they can get a bonus for fast learning which is added to the regular amount of points earned for the particular answer type. The learner needs to earn 100 points in order to get one study item to be rated as permanently learned.

Having tapped an answer in the Easy Mode, the correct study item will be displayed to the learner in combination with the translation and picture and the learner receives no points (figure 5a). In the Medium or Hard Mode, the application automatically moves to the next answer part until all parts have been inserted correctly or at least two parts were incorrect. Then the whole correct answer is displayed together with the picture, achieved points and translation of the answer. The pronunciation of the answer is played automatically. After pressing the Continue button, the example sentence for the study item is shown together with the audio of its pronunciation. For the Medium and Hard Mode, the study item answer boxes are highlighted depending on the correctness of the entered word parts or characters (see figure 5b). Tapping Continue will then lead to the next study item.

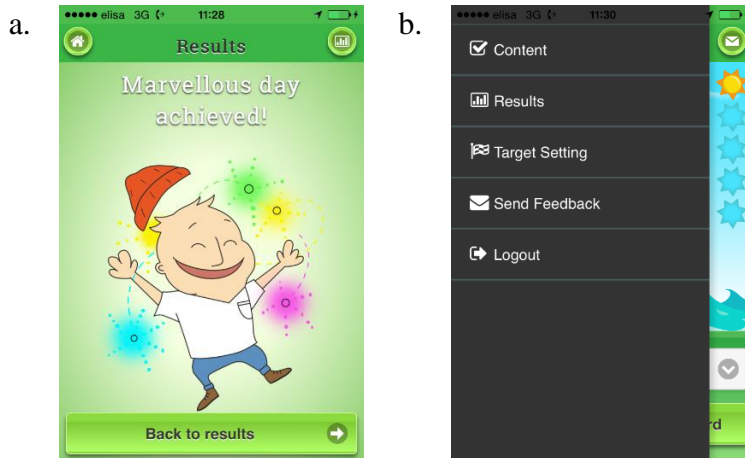
At the end of each study cycle, the level of correctness for each answered study item is displayed using the symbols described in table 1. The duration of the exercise session is displayed in combination with a clock symbol. Additionally, the progress of the exercise day is presented in a progress bar filled with the amount of points earned during that day. The progress bar shows the goal for the day and at each end of the bar, Mikko functions as additional indicator of the achieved and aimed-at progress points of that day. An exemplary Results screen as described above can be seen in figure 5c.



**Figure 5.** Wrong answer screen in the Easy Mode (a). Correct answer screen in the Medium Mode (b). Results screen (c). (WordDive Mobile, 2014)

In the Results settings, the user sets his or her daily goal in terms of the amount of time they intend to spend practicing and the level of points they wish to achieve. This is set per day. Additionally, the learner also defines the number of days they plan to study per week. To make achieving one's daily goal more motivating, there are three steps of reaching the personal goal: First, a Good Day is reached. After that, an Optimal Day is achieved. And last, if the user actually puts more effort into his studies than planned, a Marvellous Day is reached. These achievements are announced to the user when the threshold of points needed for a certain day is passed. In order to avoid disturbing the

study process, the achieved days are presented as popup windows only after a whole practice cycle is finished. Figure 6a shows an example of achieving a Marvellous Day.



**Figure 6.** Reaching a Marvellous Day (a) and planning the weekly study targets (b) (WordDive Mobile, 2014).

Other Settings can be adjusted by swiping from the right to the left over the application screen. A menu appears including different sections: Content, Results, Target Setting, Send Feedback and Logout (see figure 6b). The target setting, content selection and the results overview screen are based on the web version of WordDive and re-directing the user there for adjusting the settings. The feedback screen contains only an empty textbox for inserting one's feedback and a SEND button. For the Logout, there is no separate screen as it signs the user out of the application. Therefore, this screen is not added to the different views available.

The WordDive Mobile Application has now been described in detail including all important functionalities and features. In the following research, the WordDive Mobile Application has been used in the form as portrayed above.

### 3 Methods

In this chapter, the methodology of the research performed for this thesis will be described and all material, tools and procedure steps will be presented. The material used for data collection in the form of questionnaires and emails can be found in appendices A to D.

#### 3.1 Participants and Recruiting

The recruiting of participants for this study was conducted within two months, starting in October 2014 and finishing in November 2014. The participants were recruited online via email invitation in Finnish, English and Russian (see appendices A and C). The consent form and the questionnaires were generated using *E-lomake* version 3.1 for Finnish and English questionnaires and forms and – for reasons of character compatibility – *Google Forms* for the Russian questionnaire and form (see appendices B and D). There were two groups of participants: those, who had an active licence purchased at the time of the conduction of the study, and those, who had tried the WordDive Mobile Application in the past but did not have any active licence for WordDive on or until the 05.10.2014. Therefore, two different email messages were sent out to invite participants: One to those with a paid licence, asking them for permission to collect their usage data of the WordDive Mobile Application for the next two weeks. Another one to those without any licence, asking the same as for the paid group, but adding that they would receive a one-month licence for the mobile application for free in return for their participation. Both groups were reminded to use the WordDive Mobile Application as much as they usually would in their daily lives.

The invitation – as well as the later questionnaires – was available in three different languages, English, Finnish and Russian. Depending on the user's preferably used user interface language in the web browser version of WordDive, the email was sent to them in the respective language. Most Finnish and Russian participants had the same nationality as the language in which they participated whereas the English group was more miscellaneous. The exact group structures will be presented in more detail in the results section.

In the following sections, an overview of the utilized data collection methods will be given and the methods will be described.

#### 3.2 Data Collection: Data Mining and Questionnaires

The data for this thesis was collected using two channels: Data mining of the participants' actions and usage patterns of the mobile application and a post-test questionnaire asking the participants about their opinion on the WordDive Mobile Application and their personality.

The data mining happened via data logging in an automated way during the two weeks usage period for each participant. For the data mining process, the data on a vast amount of variables was collected. All of these variables are very specifically tied to the WordDive Mobile Application. Most variable names were chosen to be self-evident. There are more descriptive variables like the user ID, email, course ID. Then there are



time variables like start and end date. The rest of the variables describe the usage of the WordDive Mobile Application with for example the exercise duration, amount of tries per exercise cycle, amount of exercises per day and per week, speed of progress and many more. There are different types of answers which were already explained in section 2.4.2 in connection with the point system of the WordDive Mobile Application. This large amount of variables was obtained through log files from WordDive. For this study, only a selection of these variables was used in order to gain insight into usage patterns and habits of the participants.

As the collection of usage data happened in the background, participants were not necessarily aware of the process at all times. After the data collection phase was completed, a script was used to fetch the data and insert it into *Microsoft Excel* for analysis.

The post-test questionnaire (see appendix D) consisted of a first part about the participant's personal background data like age, gender and their email address for identification and mapping purposes with the data gathered through data mining. The second part of the questionnaire was the TIPI Big Five questionnaire by Gosling et al. (2003). The last part of the questionnaire included the User Experience Questionnaire by Laugwitz et al. (2008). Altogether, the questionnaire was five pages long and it took about five minutes to complete it. After finishing the questionnaire as a last step of their participation, the participants were thanked for their effort.

Data analysis was performed using *Microsoft Excel* as included in the Microsoft Office 2013 package and *IBM SPSS* version 21 release 21.0.0.0. The TIPI was recoded and analysed according to the instructions by Gosling on his online reference (TIPI Online, 2015; Gosling et al., 2003). Recoding and analysis of the User Experience Questionnaire were done based on the instructions of the creators of the scale (UEQ Online; Laugwitz et al., 2008).

## 4 Results

In the following, the results of the study will be presented in detail. First, the demographic characteristics of the participant groups will be shown, then the results of the personality questionnaire will be portrayed, after that the analysis of the cultural differences will be presented. The results from the WordDive Mobile Application usage will be shown in section 4.4. As a last part, the findings from the user experience rating of the WordDive Mobile Application will be presented.

### 4.1 Demography

Altogether, 3997 invitations were sent in three different languages. For the last step of the post-test evaluation, 207 questionnaires were sent. The exact amounts per language and licence type are displayed in table 2. Interestingly, more users were willing to participate in the group of those who already had a paid licence than in the group of those who were granted a free one-month licence. The response rates were comparable across cultures. For the invitations for participation, the response rates vary between six and nine per cent for the paying users of WordDive, and are around two per cent for the free month. The post-test questionnaire was answered and submitted by 62.9% of the participants with English as their preferred WordDive web version UI language, by 75.3% of the Finnish participants and by 69.2% of the Russian web UI language participants. For this thesis, these groups will be referred to as English, Finnish and Russian groups. The response rate was satisfactory for all three groups and therefore does not have a major implication for the motivation levels of the different language groups.

**Table 2.** Sent and answered invitations for participation and for the evaluation questionnaire, including response rates.

	I paid	I free	I eval	A paid	A free	A eval	% paid	% free	% eval
ENG	185	819	35	17	18	22	9.19	2.20	62.86
FIN	406	2059	73	28	45	55	6.90	2.19	75.34
RUS	76	331	13	7	6	9	9.21	1.81	69.23

I = invited

A = answered

paid = users with purchased, own licences

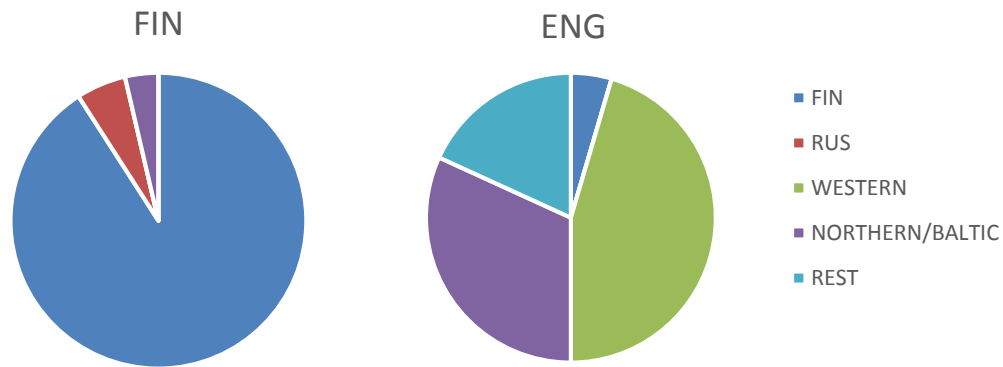
free = users without any own licence, receiving the free month licence

eval = post-test evaluation questionnaire, both paid and free users combined

% = response rate for the invitation

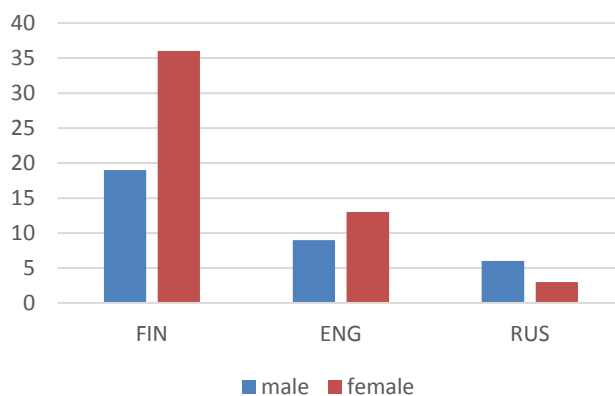
In terms of group structure, only the final groups which completed all steps of the study including the post-test questionnaire will be described. The groups were analysed with regard to their members' countries of birth. To ease analysis, the countries of birth were grouped in the following way: Finland, Russia, Western countries (like the USA, England, Ireland, Spain and France), Northern and Baltic countries (like Estonia, Sweden, Norway and Latvia) and a group of the remaining countries (like China, Turkey and the Ukraine). The English group was the most miscellaneous consisting of altogether four nationality groups: 45% of Western people, 32% of Northern and Baltic people, 5% of

Finnish people living abroad, and 18% of other nationalities like Latin American and Asian. The Finnish group was made up by 91% of Finnish people and 9% of non-Finns. The Russian group consisted of Russian people only ( $n=9$ ). The participant groups and their contained nationality groups can be seen in figure 7. The Russian group is not depicted as it homogenously consisted of Russian participants only. A Fisher's exact test showed that the group differences were statistically significant with  $p < .001$ .



**Figure 7.** The Finnish and English participant groups and their consistencies based on the nationality of their members.

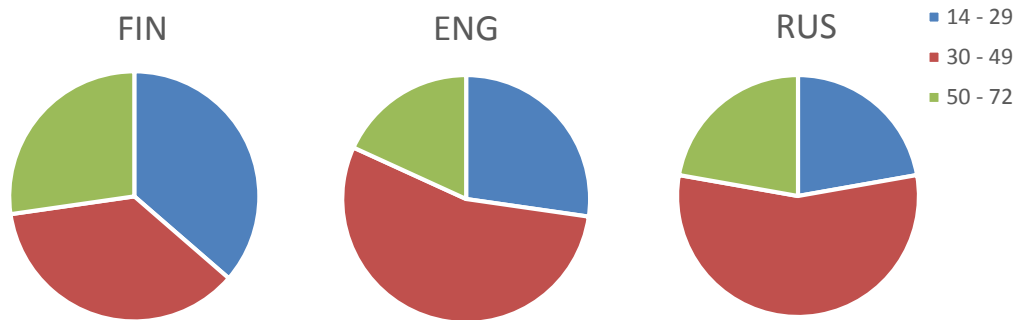
The gender distribution for the three groups was the following: In the English group, there were 9 males and 13 females. For the Finnish group, 19 males and 36 females participated. The Russian group consisted of 6 males and 3 females. Altogether, the whole sample included 34 male and 52 female participants (see figure 8). These group differences of gender distribution were not significant.



**Figure 8.** Gender distribution for all three participant groups.

The age distribution for the three groups can be found in figure 9. Age groups were divided into three: the young group ranged from 14-29 years of age, the middle group from 30-49 years and the old group from 50-74 years of age. Altogether, there were 28 young participants, 37 participants in the middle-aged group and 21 in the older group. The Finnish group consisted of 20 young participants (36.5%), 20 middle-aged participants (36.5%) and 15 old participants (27%). The English group contained six

young participants (27%), twelve participants from the middle group (55%) and four from the old group (18%). The Russian group included two young participants (22%), five middle-aged (56%) and two old ones (22%). These differences of age groups between the language groups were not significant.

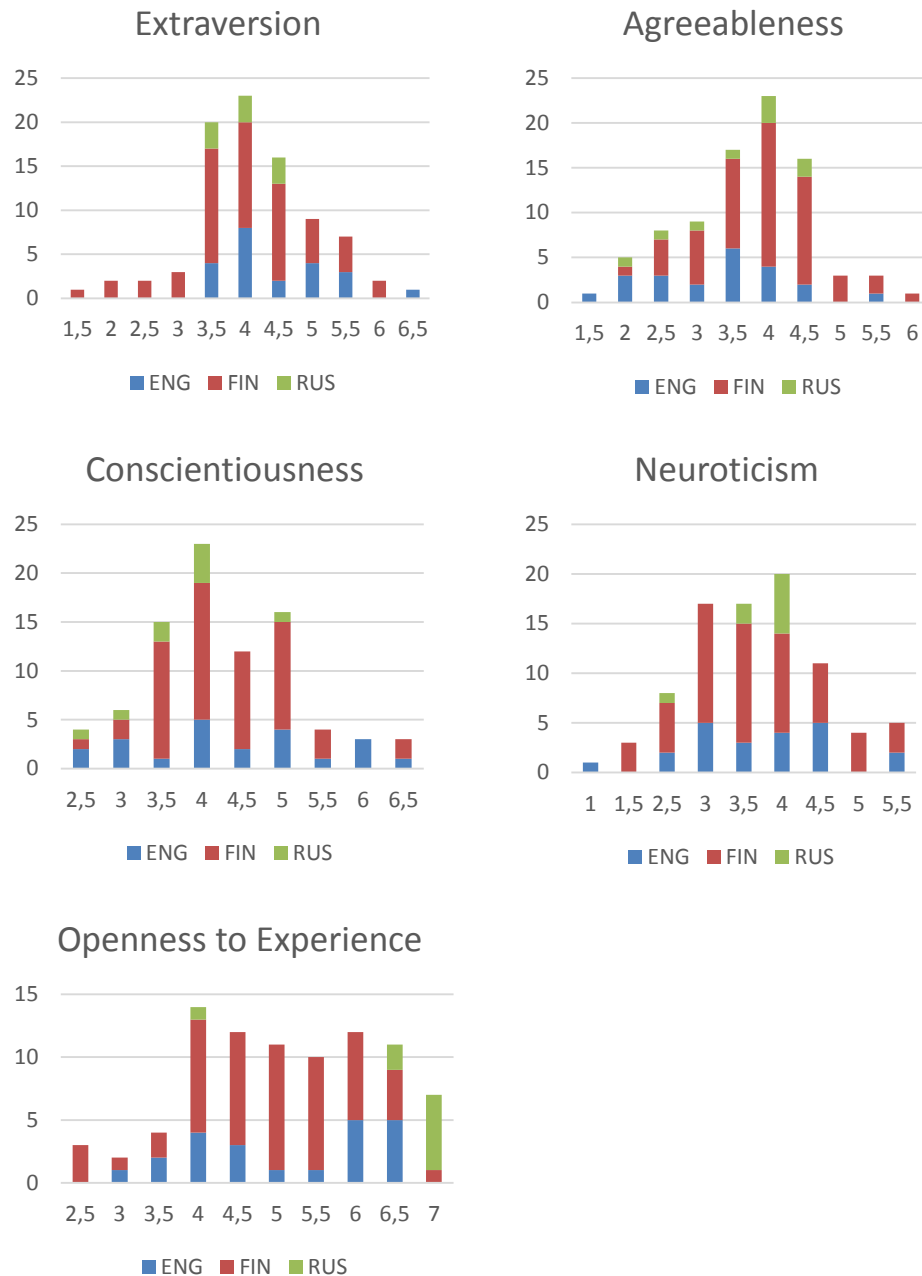


**Figure 9.** Age group distribution for all three language groups.

## 4.2 Personality

In the following paragraphs, the results of the personality questionnaire TIPI will be presented in detail. A one-way MANOVA was performed with language group as independent variable and TIPI Big Five personality measures as dependent variables. The distribution of the personality factors for the different groups can be found in figure 10. There was a statistically significant difference between personality measures based on the different participant groups ( $p < .01$ ). The test of between-subjects effects showed that there was a significant effect of language group on the personality factor openness to experience ( $p < .01$ ). No significant differences at the level of  $p < .01$  could be found between the language groups for any of the other personality factors. However, the factor Agreeableness reached significance at the level of  $p < .05$ .

A post-hoc multiple comparison using Bonferroni correction found that the personality factor Agreeableness brought significant differences between the Finnish and the English group ( $p < .05$ ), but not between the Finnish and Russian nor Russian and English group. The factor Openness to Experience showed significant differences between the Finnish and Russian group ( $p < .01$ ) and between the English and Russian group ( $p < .01$ ), but not between the English and Finnish group.

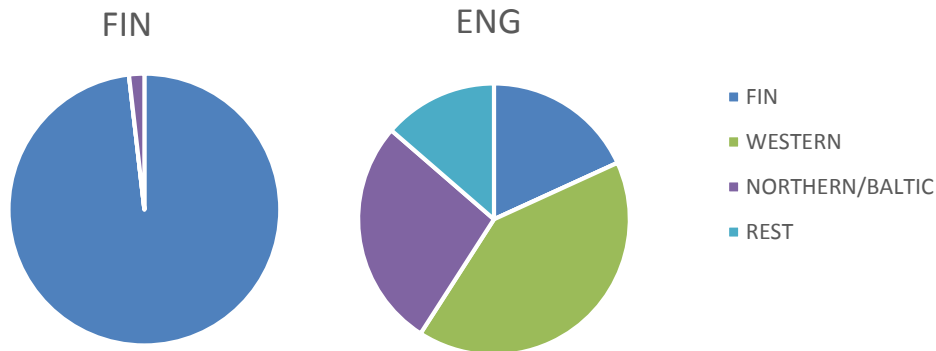


**Figure 10.** Distribution of the personality factors from the TIPI scale for all three language groups.

### 4.3 Culture

In this section, the cultural distribution of the participant groups will be described. The cultural distribution of the groups was examined for their current country of residence and their mother tongue. The analysis of the country of residence was again based on the same country groups as the analysis of country of birth in section 4.1: there was Finland, Russia, Western countries, Northern and Baltic countries, and a rest group of Asian, Latin American and East European countries. The different countries included in each group can be found in section 4.1.

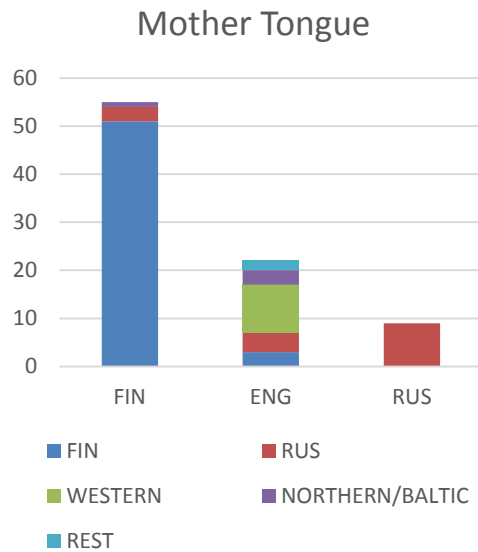
The Finnish group consisted of 54 people (98%) whose country of residence was Finland and one person (2%) who lived in Switzerland. The English group was a bit more heterogeneous with four people living in Finland (18%), nine in Western countries (41%), six in Northern and Baltic countries (27%) and three living in the Asian, Latin American and East European countries (14%). The Russian group was again homogenous with all nine people living in Russia (100%). The distributions of countries of residence for the Finnish and English group can be found in figure 11. These differences in the distributions of country of residence were found to be statistically significant at a level of  $p < .01$ .



**Figure 11.** Distributions of country of residence for the Finnish and English group.

The analysis of the mother tongue for the three participant groups (see figure 12) showed the following: The Finnish group consisted of 51 people (93%) whose mother tongue was Finnish, three (5%) whose mother tongue was Russian and one person (2%) whose mother tongue was a Northern or Baltic language (Estonian). The English group consisted of three people with Finnish as mother tongue (14%), four people with Russian as mother tongue (18%), ten people with Western mother tongues (45%), three people with Northern and Baltic mother tongues (14%) and two people with mother tongues from the rest group (9%). These differences in the distribution of the various mother tongues across the three groups were all statistically significant with  $p < .01$ .

This analysis of the cultural factors of mother tongue and country of residence showed that the three participant groups were statistically significantly different to each other in terms of culture.

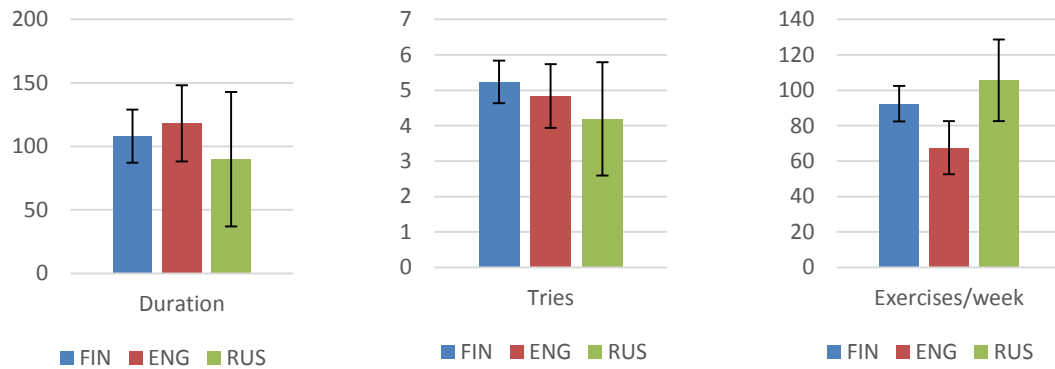


**Figure 12.** Distribution of different mother tongues for the three language groups.

#### 4.4 WordDive Mobile Application Usage

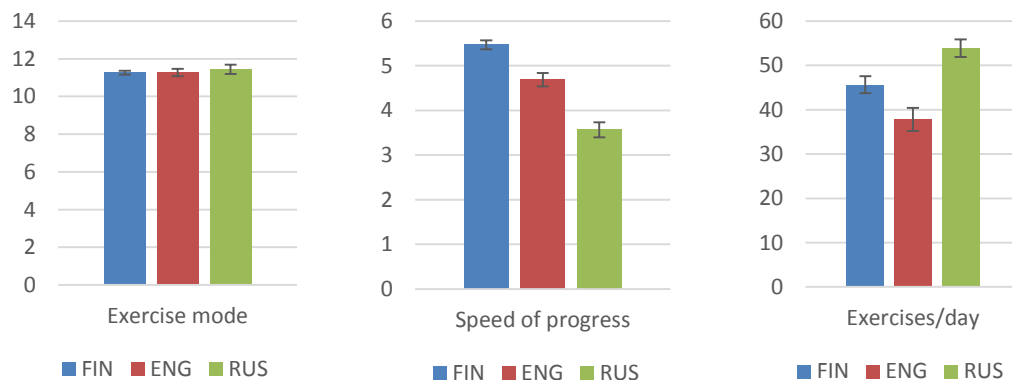
The actual usage data which was collected in an automated way via data mining was analysed based on different aspects. The collected variables for exercise duration, exercise tries, speed of progress of exercising, exercise mode used, amount of exercises done per day and amount of exercises completed per week were used for analysis. All other variables were left aside as it would go beyond the scope of this thesis to calculate measures for all possible usage data. The error bars portrayed in the following figures display the standard deviation. If not specified further, all pairwise differences were significant.

A MANOVA was calculated for the different language groups (FIN, ENG, RUS) and the duration of their practice sessions, the amount of tries they had set per practice session and the weekly amount of language studies they performed with the WordDive Mobile Application. Statistically significant differences ( $p < .05$ ) were found for the three language groups based on the duration of their single practice sessions, the amount of tries and also the weekly amount of studies (see figure 13). The average of the Finnish group (108 s.) was between the English and Russian one for the exercise duration with the English group practicing longest (118 s.) and the Russian group shortest (89 s.). Concerning the amount of tries set per exercise cycle, the Finnish group had the highest number with an average of 5,2 tries, the English was in the middle with 4,8 and the Russian was lowest with an average of 4,1 tries per exercise session. The amount of exercises done per week was lowest for the English group with an average of 67 exercises, then came the Finnish group with 92 and the Russian group was leading with 105 exercises per week on average.



**Figure 13.** Language group differences in the duration of their language exercises, the amount of set tries and the amount of exercises done per week.

For the variables speed of progress, exercise mode and amount of exercises done per day, the same calculations of a MANOVA with  $p < .05$  were performed for the three language groups. No significant differences were found for the exercise mode usage across cultures. For the speed of progress, the Russian group had the lowest value with 3,5 on average. The English group was mediocre with 4,6 and the Finnish group fastest with 5,4 on average. The amount of exercises performed per day was highest for the Russian group with an average of 53 exercises per day. Next was the Finnish group with 45 exercises per day and last the English one with 37 exercises per day. All of these differences were statistically significant with  $p < .05$ . Figure 14 shows the average distributions for all three language groups.

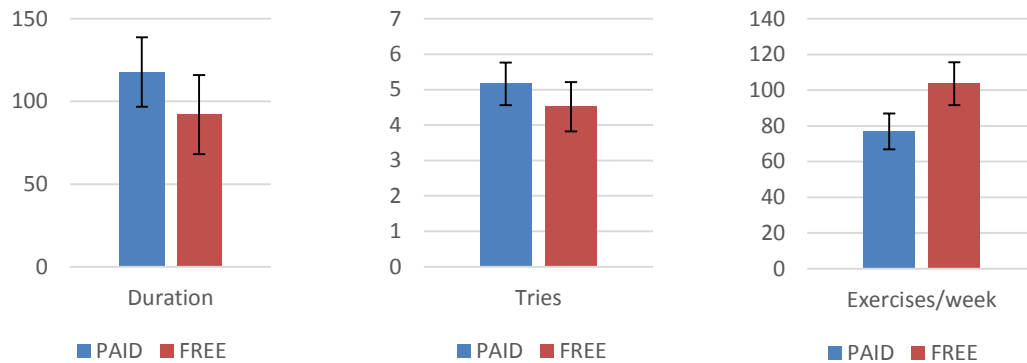


**Figure 14.** Language group differences in the selected exercise mode, the speed of progress of exercising and the amount of exercises performed per day.

A MANOVA with  $p < .05$  was calculated for the two different licence types, i.e. free licence or paid licence. The average distributions can be seen in figure 15 for the duration of studies, the tries set per exercise cycle and the amount of exercises done per week. The paid group practiced significantly longer per exercise cycle with on average 117 s. compared to 92 s. for the free group and had set significantly more tries per exercise cycle with an average of 5,1 tries versus 4,5 for the free group. However, for the amount of the exercises per week, the free group practiced significantly more with 103 exercises

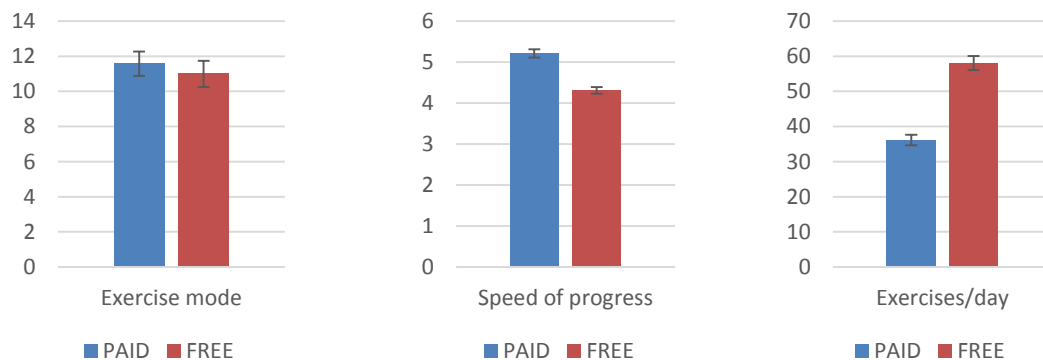


per week on average compared to 76 exercises for the paid group. Again, all differences were statistically significant with  $p < .05$ .



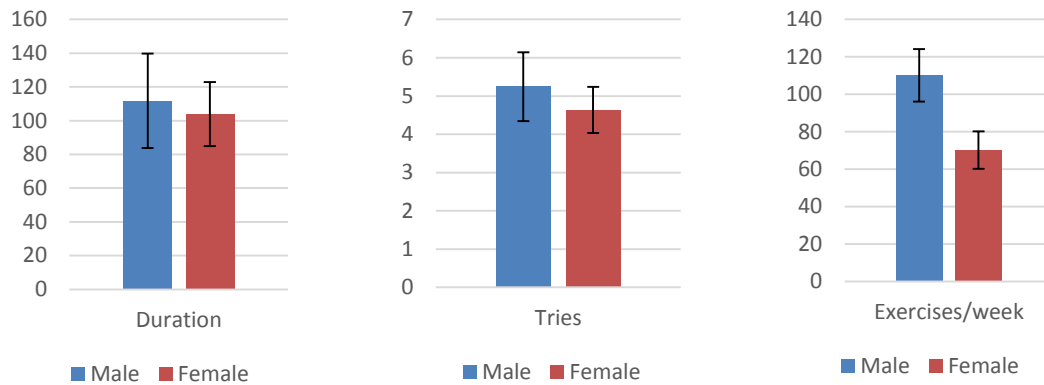
**Figure 15.** Licence type differences in the duration of the language exercises, the amount of tries and the amount of exercises done within one week.

For the differences between paid and free licence participants concerning the speed of progress, exercise mode used and the amount of exercises completed per day, a MANOVA was calculated. The results showed that the paid group preferred the hard exercise mode (11,7) whereas the free group rather used the medium mode (11) for their exercises. This difference was statistically significant. The speed of progress was significantly slower for the free group with an average of 4,3 compared to the paid group with 5,2 ( $p < .05$ ). The amount of exercises done daily produced a statistically significant difference of 36 exercises on average for the paid group and 58 for the free group with  $p < .05$ . These differences are presented in figure 16.



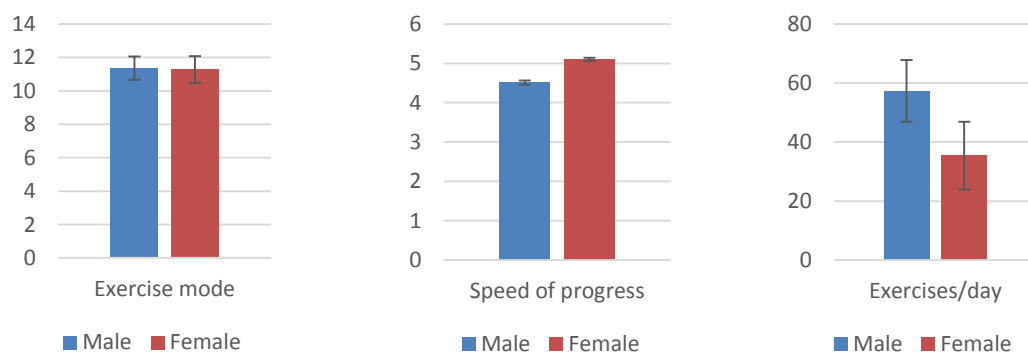
**Figure 16.** Licence type differences in the exercise mode, the speed of progress and the amount of exercises completed daily.

For investigating differences between males and females in their exercise duration, amount of tries per cycle and amount of exercises per week, a MANOVA was calculated. For all three categories, the gender differences were significant at a level of  $p < .05$  (see figure 17). The average duration of exercising for male participants was 111 s. and for female participants 103 s. Male participants' amount of tries was set to 5,3 on average whereas female tries was 4,6. The amount of exercises per week was significantly higher for males with 110 compared to 70 for females.



**Figure 17.** Gender differences in the duration of the language studies, amount of tries per exercise cycle and the amount of exercises per week.

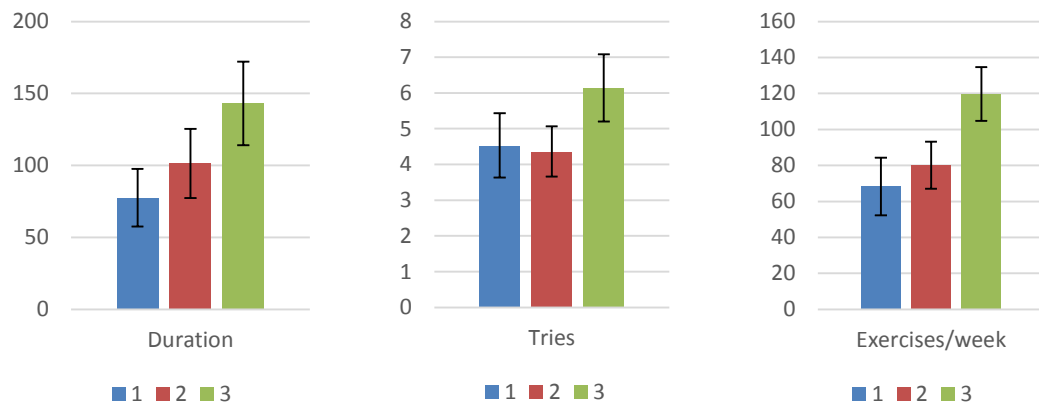
Concerning the speed of progress, the exercise mode chosen and the amount of exercises done per day, a MANOVA was calculated to investigate gender differences. The male and female group did not show any significant differences in the selected exercise mode. For the speed of progress, the female participants were significantly faster than the male participants with an average of 5,1 versus 4,5 ( $p < .05$ ). The amount of exercises performed per day showed a statistically significant difference between male and female participants. Male participants did 57 exercises per day on average whereas females completed only 35 exercises daily. These differences were significant on a level of  $p < .05$ . Figure 18 shows the average distributions of male and female differences for the selected exercise mode, the speed of progress and the daily amount of exercises.



**Figure 18.** Average distributions for gender in the variables exercise mode, speed of progress and daily exercise amount.

The age groups were examined for differences in their exercise duration, amount of tries per exercise cycle and amount of weekly exercises. A MANOVA was calculated with a significance level on  $p < .05$ . The exercise duration and the amount of exercises per week were significantly different for all three age groups. The tries were significantly different only between age groups 1 and 3 and age groups 2 and 3, but not between age groups 1 and 2. See figure 19 for an overview of the average values of these results. The young age group had the shortest duration of their language exercises with 77 s. on average, followed by the middle-aged group with 101 sec. on average and the older group had the longest average duration with 143 s. Concerning the amount of tries, the young

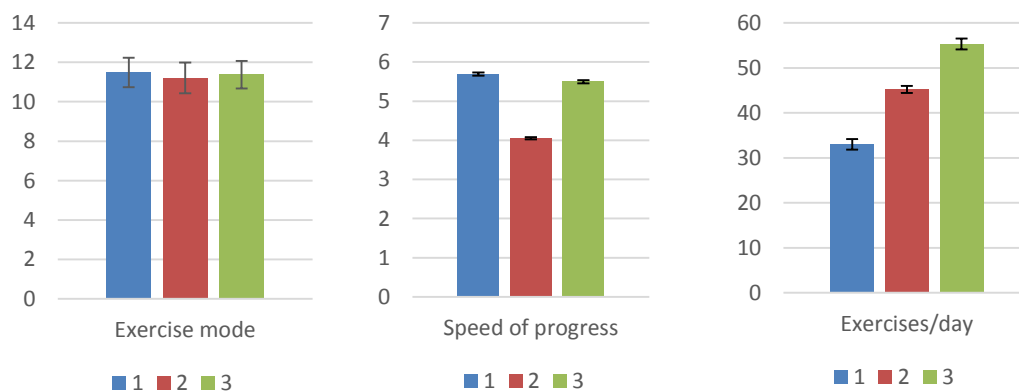
and middle-aged group did not produce any significant difference – 4,5 tries on average for the young group and 4,4 for the middle-aged group. However, the old group's amount of tries was significantly different from the other two groups with an average of 6,1 tries. Regarding the amount of exercises per week, the youngest group did the least amount of exercises with an average of 68, then came the middle-aged group with 80 exercises per week on average and highest scored again the old group with 119 exercises per week on average.



**Figure 19.** Age group differences in the exercise duration, amount of tries per exercise cycle and the amount of exercises done per week.

1 = young (14-29 years); 2 = middle-aged (30-49 years); 3 = old (50-74 years)

Differences for the age group results in the speed of progress, amount of exercises done daily and the selected mode of exercising were analysed in a MANOVA. For the exercise mode, the age groups did not show any significant differences. The speed of progress was slowest for the middle-aged group with an average of 4, followed by the older group with 5,5 and the young group with 5,7. These differences were statistically significant for all pairs with  $p < .05$ . The amount of exercises done daily was highest for the old group with an average of 55 exercises per day. The middle-aged group did 45 exercises daily and the young group 33 exercises per day. Again, all differences were statistically significant with  $p < .05$ . Figure 20 shows the age group differences for speed of progress, amount of daily exercises and exercise mode.



**Figure 20.** Age group differences in the selected exercise mode, the speed of progress of exercising and the amount of exercises performed per day.

For the evaluation of the relationship between the participant's personality differences and their usage of the WordDive Mobile Application, Pearson correlations were calculated. Table 3 shows the correlation values between the Big 5 personality factors Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness to Experience and the usage data from the WordDive Mobile Application for exercise duration, exercise tries, speed of progress, exercise mode, amount of daily and weekly exercises. These correlations were calculated with a significance level of .01 and .05, each 2-tailed. As can be seen from the table, significant negative correlations were obtained for the personality factor Extraversion on all usage data variables except for the amount of tries which showed a significant positive correlation ( $r = .067$ ). The personality factor Agreeableness correlated significantly positively with all usage variables except for the exercise mode which uttered a significant negative correlation ( $r = -.191$ ). The amount of daily exercises did not produce any significant correlation for the Agreeableness score ( $r = .026$ ). For the personality factor Conscientiousness, significant positive correlations were found for all usage variables except for the exercise mode which again showed a significant negative correlation ( $r = -.107$ ). The factor Neuroticism produced significant negative correlations for the speed of progress ( $r = -.208$ ), tries ( $r = -.226$ ), amount of exercises per day ( $r = -.034$ ) and per week ( $r = -.114$ ). However, it uttered significant positive correlations for the exercise mode ( $r = .180$ ) and the duration of exercising ( $r = .064$ ). The personality factor Openness to Experience showed significant positive correlations for the exercise duration ( $r = .098$ ), the speed of progress ( $r = .097$ ) and the amount of tries ( $r = .029$ ). It produced significant negative correlations for the selected exercise mode ( $r = -.103$ ) and the amount of exercises per day ( $r = -.053$ ). A negative correlation below the level of significance was found for the amount of exercises per week ( $r = -.021$ ) for the factor Openness to Experience.

**Table 3.** Pearson correlations for the relationship between the participants Big 5 personality scores and their WordDive Mobile Application usage data.

	Extra- version	Agreeable- ness	Conscien- tiousness	Neuro- ticism	Openness
Exercise mode	-.112**	-.191**	-.107**	.180**	-.103**
Duration	-.027*	.117**	.122**	.064**	.098**
Speed of progress	-.061**	.259**	.076**	-.208**	.097**
Tries	.067**	.101**	.160**	-.226**	.029*
Exercises / day	-.084**	.026	.223**	-.034*	-.053**
Exercises / week	-.072**	.059**	.236**	-.114**	-.021

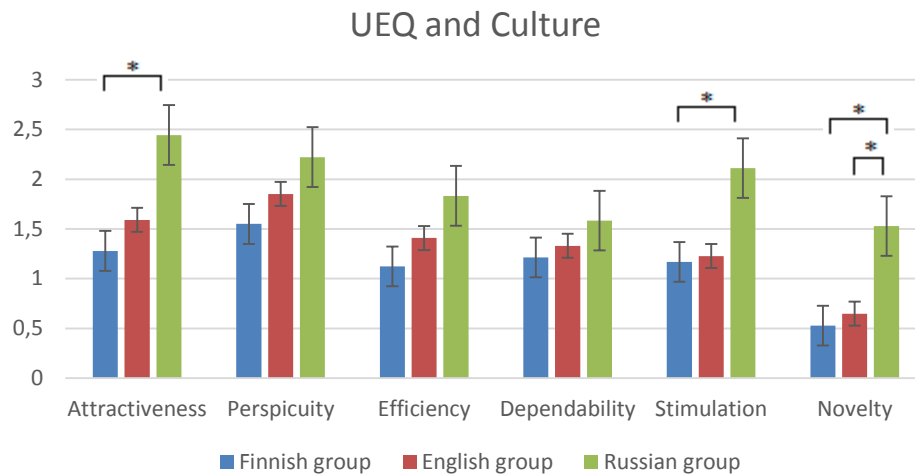
\*\* significant at the .01 level (2-tailed)

\* significant at the .05 level (2-tailed)

#### 4.5 User Rating of the Application

The user rating of the User Experience Questionnaire (Laugwitz et al., 2008) was analysed in terms of the language groups. Within the Finnish group ratings, it showed the highest scores for the items measuring perspicuity. Attractiveness and perspicuity were rated highest within the English group. The Russian group gave the highest ratings for attractiveness, perspicuity and simulation. The factor novelty was rated significantly

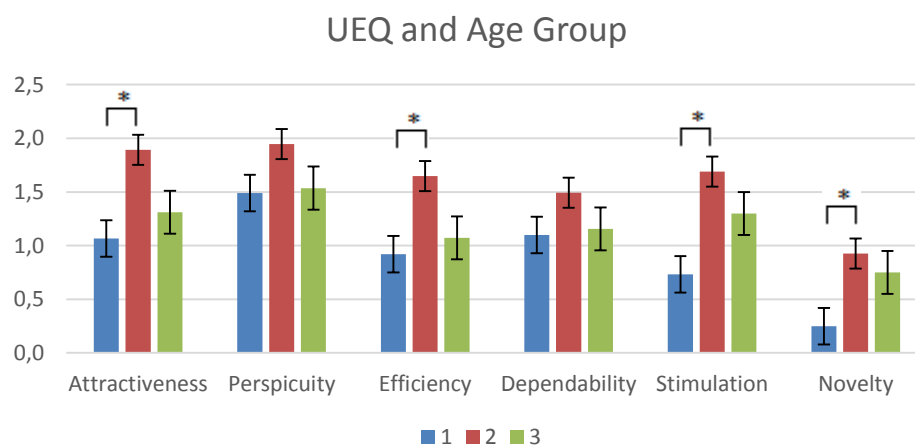
higher by the Russian group than by the English or Finnish group (see figure 21). Only the mean rating of the Finnish and Russian group for the Attractiveness, Stimulation and Novelty items were significantly different ( $p < .05$ ).



**Figure 21.** User Experience Questionnaire (UEQ) ratings for the Finnish, English and Russian participant groups.

\* significant difference ( $p < .05$ ).

The UEQ ratings did not show any significant differences between male and female participants. For the age groups and the UEQ ratings, a MANOVA was calculated. Statistically significant differences were found for the rating of Attractiveness between the young and middle-aged group ( $p < .001$ ), but not for any other pair of age groups. No statistically significant differences could be found for the rating of Perspicuity and Dependability. The rating of Efficiency, Stimulation showed significant differences between group 1 (young) and 2 (middle-aged) with  $p < .01$  and the Novelty rating uttered statistically significant differences for the same pair with  $p < .05$ . No statistically significant differences were found for any of the ratings between the middle-aged and older group (see figure 22).



**Figure 22.** UEQ ratings for each age group.

1 = young (14-29 years); 2 = middle-aged (30-49 years); 3 = old (50-74 years)

\* significant difference ( $p < .05$ ).

The differences in the rating of the UEQ and the participants' personality scores were examined calculating two-tailed Pearson's correlations between their Big 5 personality scores and their UEQ ratings (see table 4). For the personality factor Extraversion, positive correlations were found with all UEQ dimensions. However, only the correlation with Perspicuity crossed the threshold of statistical significance at the .05 level ( $r = .249$ ). The factor Agreeableness produced negative correlations with all dimensions of the UEQ. Only the correlations with Efficiency ( $r = -.217$ ) and Agreeableness ( $r = -.272$ ) were statistically significant at the level of .05. The personality factor Conscientiousness uttered negative correlations with all UEQ dimensions except for Novelty. None of the correlations reached a significant level. The factor Neuroticism correlated negatively with all UEQ rating dimensions but no correlation was statistically significant. The personality factor Openness to Experience showed positive correlations with all UEQ rating dimensions. The correlation with the dimension Novelty ( $r = .332$ ) was highly significant and the correlation with the UEQ rating of Efficiency ( $r = .216$ ) was significant at the .05 level. The other correlations did not reach statistical significance.

**Table 4.** Pearson correlations for the relationship between the participants Big 5 personality scores and their WordDive Mobile Application usage data.

	Extra- version	Agree- ableness	Conscien- tiousness	Neuroticism	Openness
Attractiveness	.137	-.272*	-.100	-.097	.205
Perspicuity	.249*	-.134	-.148	-.061	.139
Efficiency	.182	-.217*	-.183	-.088	.216*
Dependability	.090	-.069	-.170	-.132	.095
Stimulation	.056	-.202	-.092	-.112	.177
Novelty	.037	-.193	.013	-.049	.332**

\*\* significant at the .01 level (2-tailed)

\* significant at the .05 level (2-tailed)

In the following chapters, the obtained results will be discussed in the light of previous and current research findings. Unexpected findings will be explained and issues or questions arising from these findings are addressed. Furthermore, future perspectives and recommendations will be presented from the lessons learned in the construction and performance of this study.

## 5 Discussion

The results presented in chapter 4 covered various areas of research and will thus be discussed first in comparison to findings of other studies in the field of mobile learning and mobile language learning. After that, issues which emerged from the findings will be addressed and questions arising from the data of this study will be formulated. As a last part, perspectives for future research in the same area will be considered and explained.

### 5.1 Results Overview and Contrast to Current Research

In the following subsections, the results of this thesis will be discussed in comparison to other research outcome. First, implications of gender and age group differences on language learning will be presented. After that, the role of personality for language studies will be examined. Culture and its effects on language learning using the WordDive Mobile Application follow in section 5.1.4. The last segment discusses the obtained results from the questionnaire on user experience and their relation to current research in the field of user experience and usability.

#### 5.1.1 Discussion and Evaluation of the Factor Gender

The evaluation of the participants' gender and age group in relation to their mobile learning patterns produced interesting findings. For the gender, male participants outdid the female participants in the duration of their studies, the amount of tries, the amount of exercises completed per day and also per week. The only variable where the female participants were superior is the speed of progress. However, no significant differences were found for the selected exercise modes between male and female participants.

This finding is interesting as it suggests that females practice less often and use less time for their language studies. Women seem to practice the same modes as their male counterparts do but still reach their goals faster. Interestingly, Noll et al. (1998) could not discover any significant differences between the abilities of male and female participants in terms of their cognitive abilities or intelligence. This suggests that the differences have to be derived from other factors than from intelligence. In their study, Harasty et al. (1997) investigated the size of language areas in the brains of 10 male and 11 female patients at a hospital in Sydney, Australia. They found that in female brains those areas related to language were bigger than in male brains. In detail, their female participants had a larger superior temporal gyrus (Wernicke's area) and inferior frontal gyrus (Broca's area). The Broca's area is associated with language production and Wernicke's area is responsible for the understanding of language (Eysenck et al., 2005). These findings support the superior language skills found in females compared to males. For the male group this means that they might not pay as much attention when studying with the WordDive Mobile App and therefore do not reach their study goals as fast as the female participants. Another explanation could be that the female brains are more apt to learn and handle languages faster with less effort than male brains. Research in the area of language development and language abilities suggests that women are faster and more efficient language learners due to evolutionary reasons as found by Harasty et al. (1997).

According to Cattell (1987) another alternative is that male and female children develop differently fast in their cognitive abilities just in the same way as they show different physical growth patterns during childhood. However, this finding could only explain gender differences in language learning during childhood and has limited implications on the current study results. Nevertheless, it has to be taken into account when developing language courses for children in elementary schools which is also a part of the WordDive language course range.

Pawlak (2013) examined the connections between language learning strategies and individual, situational and group factors. As individual factors he defined a person's age, motivation, gender and experience. The situational factors included culture, ethnicity, the instructional setting and the task type. The group factors were represented in different socially constructed goals which were shared among the students. His study included 280 participants of Polish students who were carrying out their studies of the English language at university. Pawlak's research produced the following findings: for the categories of memory and metacognition, female participants showed a significantly higher usage of learning strategies than male participants. They used strategies such as remembering a word's position on the page in order to remember the word's meaning, using recently learnt words in sentences in order to remember them better or writing the new words down several times to improve their memorizing. Additionally, females used a number of specific strategic devices such as TV programmes in English or starting conversations in English instead of Polish. The creation of notes and speaking out the learnt words aloud also belonged to the list of learning devices utilized to gain better results. This also supports the findings of this thesis as the WordDive Mobile Application makes the writing and voiced repetition of the words available to the learners. If indeed female participants used these tools more like Pawlak's study suggests, then it also explains the better result of the female participants in the WordDive Mobile Application usage.

In her study, Hulick (1998) examined the change of human cognitive abilities with age. She investigated the qualitative and quantitative differences connected to a person's gender and age with regard to their cognitive abilities. Her study sample consisted of 2800 participants divided into two groups: adults (over the age of 18 years) and children/adolescents (under 18 years of age). Her sample was balanced across the two groups. Concerning gender differences in cognitive abilities, Hulick found that young females showed better auditory processing skills and a higher level of processing speed compared to older females or males. For the adult group, women had better visual processing abilities whereas men were superior in their quantitative abilities. It has to be noted, however, that none of these findings proved to be statistically significant. As an interpretation, Hulick suggests that gender differences actually do exist even if they were only minimal in her study. She also points out that past research was able to produce evidence for gender differences in cognitive abilities. Concerning the results of this thesis this means that the better results of the female participants could be explained by the fact that females have better auditory and processing skills which are needed for language learning in general and also with the WordDive Mobile App. Also the better visual



processing skills of older females contribute to the study success for the female group obtained in this thesis. The WordDive Mobile Application involves pictures and therefore visual material for studying languages. This clearly supports female learner's development of abilities as suggested by Hulick. For the male participants, it is possible that their cognitive development decreases their chances to be as successful with the same amount of study effort as females are. Their superior quantitative abilities might not be involved in language learning and therefore not add to their learning success. This is also in line with the findings of this thesis as male participants performed significantly worse than females even though they invested more study effort and time.

### **5.1.2 Discussion and Evaluation of the Factor Age**

Regarding the differences between the age groups of 14-29 years (young), 30-49 years (middle-aged) and 50-74 years (old), statistically significant differences were found. The old group reached highest scores in the duration of their exercises, the amount of tries, the amount of exercises done per week and per day. The middle group was second and the youngest group practiced least. However, for the speed of progress, the youngest group was fastest, followed by the older group and then the middle group. The exercise mode was similar for all age groups.

This finding follows the expected pattern as the youngest group should be able to learn fastest with the least amount of effort. The reversed pattern should apply for the older group. Therefore, the findings concerning the age of the learner and the learning patterns and outcome do support past and recent research. For example, a study conducted by Noll and Horn (1998) which investigated the differences in cognitive ability for people of different age and gender found that during adulthood the fluid intelligence abilities decline and the crystallized abilities increase. Fluid intelligence is commonly defined as the ability to reason under novel conditions whereas crystallized intelligence represents the knowledge and reasoning which we learn during our acculturation. Fluid abilities contain factors such as concentration, apprehending and recalling information over short periods of time, and thinking quickly. These abilities decline with advancing age in adulthood and thus the fluid intelligence declines with advancing age.

Learning a new language definitely counts to the abilities covered by fluid intelligence as an unknown, new language clearly represents a novel situation which requires reasoning and learning. Noll and Horn (1998) found that fluid intelligence and its decline with age is connected to the decline in the ability to concentrate. Furthermore, the ability for short-term apprehension and retrieval declines and the cognitive speed goes down with increasing age, too. According to their findings, the fluid intelligence declines monotonically with age. The findings of this thesis research are in line with the findings of Noll and Horn as in the present participant group, the youngest participants needed significantly less time to learn and learnt faster than the middle-aged or older participants. This result is linked to the theory of crystallized and fluid intelligence and the development of these with increasing age. Abilities like fast thinking, storage of information in short-term memory or focusing on the studies are required when learning a language. Therefore, the WordDive Mobile App is a more efficient tool for language

learning for younger people than for older people possibly due to the fact that the older a person is the more their fluid intelligence abilities decline.

In his study, Hulick (1998) found both quantitative and qualitative differences in cognitive abilities for different age groups. He tested for example the visual processing, fluid reasoning, processing speed, quantitative abilities, picture recognition, visual matching and other cognitive skills. As a result, the largest difference in cognitive abilities between the children/adolescent group and the adult group was obtained for the performance levels. In general, adults were able to reach higher scores in all cognitive abilities. Hulick suggests that the changes in cognitive abilities might be due to increasing age more than due to gender effects and he claims that different types of cognitive abilities change in different ways with age. For the findings of the present thesis research, this means that the significant differences in language learning performance found for the different age groups are in line with the study findings and implications by Hulick. Age as a major factor of influence for the cognitive skill levels can be a possible explanation of the obtained differences and especially the superior results of the young group compared to the middle-aged and older group.

### **5.1.3 Discussion and Evaluation of the Factor Personality**

In the following paragraphs, the exercise results will be discussed in connection with the personality data of the participants obtained via the TIPI questionnaire (Gosling, 2003). Significant correlations were obtained for all five personality factors in connection with the usage results of the participants. The factor Extraversion was negatively correlated with the duration of exercises, speed of progress, amount of exercises done per day and week and with the exercise mode selected. The only positive correlation was obtained for the amount of tries. The factor Agreeableness was positively correlated to all usage variables except for the exercise mode. The factor Conscientiousness showed the same pattern as the factor Agreeableness. For Neuroticism, positive correlations were found for the exercise mode and the duration of exercises. Negative correlations were obtained for all other usage variables. Openness produced positive correlations with the variables exercise duration, speed of progress and tries and negative correlations with the exercise mode, the amount of exercises per day and week.

A study by Eyong and Schniederjans (2004) about the connection between personality and web-based education showed that the personality characteristics of the students can strongly predict the outcome of their study success. They found that Agreeableness, Stability (as the opposite end of the Neuroticism dimension) and Openness were highly related to the students' study success. The factors Conscientiousness and Extraversion produced moderate, but also significant ( $p < .05$ ) correlations. If we consider the measure speed of progress as a possible representative of the study success in the research of this thesis, then the findings are mostly in line with the ones of Eyong and Schniederjans. The factors Agreeableness, Conscientiousness and Openness produced significant positive correlations with the speed of progress suggesting that the higher a person scored on these factors the higher their speed of progress measure was. For the factor Neuroticism, a significant negative correlation was obtained which

also supports the findings for Eysenck and Schneierjans because the negative correlation of Neuroticism in the present thesis research corresponds to the positive correlation of Stability in their study. The only factor which produced different results is Extraversion. Eysenck and Schneierjans found moderately positive correlation with the study success whereas this thesis produced a weak but significant negative correlation. This might be due to other factors like the study method involved or the age group. They only included participants aged 20-30 years whereas this study includes all ages from 14 to 74 years. Using a mobile application might have a different effect on extraverted people than taking part in a web-based course including the usage of books and course material. However, these suggestions have to be tested in future research projects.

Komarraju et al. (2009) investigated the role of personality in connection with the academic motivation and achievements of college students. They asked college students to fill in the Five Factor Personality Inventory, the Academic Motivations Scale to measure their study motivation and they had to report their college grade averages. The focus of their study lay on the connections of personality with the extrinsic and intrinsic motivation and amotivation – meaning lack of motivation – of students. The results showed that the factors Conscientiousness and Openness were related to the students' intrinsic motivation. Conscientiousness and Extraversion were connected to the extrinsic motivation and Conscientiousness and Agreeableness were related to amotivation. Intrinsic motivation is defined as motivation from the inside, to want to accomplish and succeed and to seek for learning something new. Extrinsic motivation means to be motivated from the outside, for example in the form of external rewards or punishment. Amotivation is a state of not caring and being immune to outside rewards. Komarraju et al. (2009) claim that Conscientiousness is a strong predictor of a person's academic success and exam performance due to the fact that more conscientious people are more disciplined and achievement oriented. As further results, Komarraju also found that high Conscientiousness is connected to a high level of intrinsic and extrinsic motivation. This finding means that more disciplined and organized students tend to be more motivated in their studies. This is in line with the findings of the present thesis showing a positive correlation between Conscientiousness and speed of progress, study duration, and amount of exercises per day and week.

Payne et al. (2007) found that students with high scores in conscientiousness and openness are more oriented towards their learning goals which further supports the findings of this thesis as can be seen below. The factor Openness involves intellectual curiosity whereas Agreeableness is connected to the ability to trust, cooperate and follow academic rules. According to Komarraju et al. (2009), both Openness and Agreeableness correlate positively with academic performance. The findings of this thesis also found significant positive correlations between Openness and speed of progress, exercise duration and the amount of exercises per week. These results can be explained by the fact that higher levels of Openness are connected to curiosity and the ability to enjoy learning. However, a negative correlation was found with the amount of exercises per day. This finding is not in line with previous studies and future research is needed to further

investigate the relation between Openness and daily study motivation. In the current thesis the factor Agreeableness was positively related with all exercise measures except for the exercise mode which does not represent study success or motivation. Regarding the obtained results for the factor Agreeableness and its correlations, this thesis is in line with the research of Komarraju et al. suggesting that Agreeableness is related to being more cooperative and peaceful and therefore more successful in one's studies. The factor Extraversion showed negative correlations with all study measures except for the amount of tries. Therefore, the implication uttered by Komarraju et al. that being extraverted generally also means to be warmer and sociable which by itself might be a reason to engage in studies at college can be supported by the findings of this thesis. More extraverted students might be more interested in socializing than in their actual studies and therefore extraversion is related to poor study outcomes.

Concerning the personality factors Neuroticism and Extraversion, these have also been proved to be related to a student's fear of failure and avoidance of performance goals by Payne et al. (2007). A high level of Neuroticism is connected to being emotionally more unstable and having less impulse control. This is according to Komarraju et al. (2009) negatively related with academic success and also positively related with amotivation. As the factor Neuroticism produced significant negative correlations with four out of six usage measures of the WordDive Mobile Application, this claim can be supported by this thesis' results to a great extent. Komarraju et al. also state that up to date, there are only few studies which aim at examining the relationship between personality and academic motivation. Therefore, future work on this field of research is needed.

Studenska (2011) conducted a study on the effects of personality for self-regulation in foreign language learning. Self-regulated learning is defined as autonomous learning which also plays an important role in learning with WordDive. When there is no teacher or fixed study dates, a higher level of autonomous learning is required by the student. The results of Studenska suggest that difficulties in autonomous learning correlate negatively with Conscientiousness and Openness and positively with Neuroticism. This again supports also this thesis' finding of Conscientiousness and Openness being positively related to most of the study measures from the WordDive Mobile Application usage. Neuroticism was found to be negatively related to four out of six measures and therefore also this finding is in accordance with Studenska. Personality traits seem to influence differences in the autonomy of foreign language learning. However, like in the findings of this thesis, the relationships obtained by Studenska also were significant but not very strong.

Another study also in the field of self-regulated learning and personality was performed by Bidjerano and Yun Dai (2007). They found that factors related to self-regulated learning such as persistence, analytic learning, time management and cognitive self-regulatory skills correlated with Conscientiousness. For the WordDive Mobile Application Conscientiousness was also positively related with study success and the duration and frequency of studies. The factor Agreeableness was found to influence a

more reproductive learning style with higher effort in the research conducted by Bidjerano et al. This can account for the finding of this thesis that higher levels of Agreeableness were positively related to five out of six study measures. High scores in Agreeableness and Openness are beneficial for self-regulation in the context of learning. According to Bidjerano et al., the personality factors of Extraversion and Neuroticism proved to be impedimental for self-regulatory learning behaviours. High levels of Extroversion were connected to poor reflective skills, problems in time management and effort regulation. High levels of Neuroticism were related to a high effort motivation but lower cognitive abilities and problems in analytic and critical thinking. The results of this thesis produced negative correlations of Extraversions with five categories and Neuroticism with four categories of the WordDive Mobile Application usage. The findings support the interpretations of Bidjerano et al. (2007) suggesting a hindering influence of Extraversion and Neuroticism on self-regulated learning.

#### **5.1.4 Discussion and Evaluation of Cultural Implications**

In terms of cultural differences connected with online language learning, the results showed the following: The Finnish group reached the highest scores in the amount of tries per exercise cycle and in the speed of progress. The English group was second and the Russian group last. However, the Russian group scored highest on the amount of exercises done per day and per week. The Finnish group was second and the English group last. For the duration of exercises, the English group practiced longest, followed by the Finnish group and then the Russian group. Interestingly, there seem to be different patterns for cultural variations in online language learning as each of the three groups was leading in at least one of the tested categories. Concerning the preferred exercise mode, there were no statistically significant differences between the three cultural groups. The exercise mode results will be discussed further in section 5.2 where the future suggestions for the WordDive Mobile Application in connection with the results of the current study are presented.

The above-mentioned findings can be interpreted in context of a study by Vatrappu et al. (2007) which aimed at investigating the connections between culture, technology and learning. One of the basic assumptions of that study was that social affordances possibly differ along cultural dimensions. That means that depending on the culture, the type of social affordance is different. They used Hofstede's (1997) cultural dimensions and came to the conclusion that in interaction with technology in their studies, Western people are more analytic whereas East-Asians have a more holistic approach. For example, in an individualistic culture, it is more tolerated to make mistakes.

This theory could explain why in the present study, the English group reached the longest study durations but not the highest speed of progress. In their culture making mistakes is not problematic and therefore they did a lot of exercises where they made mistakes and thus progressed more slowly. The Finnish group had exercised second most per week and day and had the fastest speed of progress and highest tries. That means, they are working very hard to reach their goal and avoid making mistakes. This finding is in line with Vatrappu and Suthers (2007) who suggested that Westerners are more analytical

in using technology for learning. The Russian group was last in the speed of progress and amount of tries but first in the amount of exercises per week and day and also in the duration of their exercising. This suggests that the Russian group was very hard working and studied a lot but did not reach the best results. It might be that for the Russian group the overall picture counts more meaning that they try hard and practice a lot but are not the fastest progressing group. That would support the more holistic approach for Eastern societies as suggested by Vatrappu and Suthers in their study.

Another explanation of the different usage patterns for the three culture groups could be found in the book by Galitz (2007) which states that for different cultural groups the design of a user interface has to be adjusted. Galitz suggests that the following variables play a role in people's interpretation and handling of a user interface and therefore have to be modified according to a culture's traditional patterns: text, numbers, date and time formatting, images, symbols, colours as well as the application's flow and functionality. These factors have to be considered differently for different cultures. As the WordDive Mobile Application of v.1.4 was not adjustable for any of these factors, it is possible that these influenced the perception and learning frequency and possibly also the learning outcome of each cultural group. WordDive is a Finnish company which might partly explain the Finnish group's top results in app usage. The Finnish group was able to progress fastest and avoid mistakes and they also used the application second most. This might be due to the fact that a Finnish company's design and flow of functionality suits best to the Finnish user group and is more of a disadvantage for both the Russian and the English group. This finding should be tested in future research to see if the country and culture of origin of the company behind a certain programme or application actually does influence the programme's suitability for different cultural groups. If so, this is a major finding and has to be taken into account by app developers in the future. To be aware of one's own cultural design constraints and therefore be able to avoid imposing limitations on the users in terms of colours, date and time formatting, numbers, text, symbols, and certain functionalities could have a large impact on the international and intercultural usability and user experience of an application. Of course, not all factors can be made adjustable and it depends on the particular programme how much of this can actually be realized in future development considerations.

### **5.1.5 Discussion and Evaluation of Licence Type Effects**

In the light of a learner's motivation, the results of this study suggest that paying for a service actually does increase the learning motivation as the participants with a paid licence for the WordDive Mobile Application studied significantly longer with it. Additionally, their speed of progress and their amount of tries were significantly higher than the free licence group's results. Interestingly, the free licence group has practiced significantly more often as their amount of exercises per week and per day were significantly higher than the same values of the paid group. Additionally, the free licence group also used the medium exercise mode more frequently whereas the paid group preferred the hard exercise mode.

Krug and Braver (2014) investigated in their study the interactions between motivation and cognition. They found that payment as a reward makes people more likely to participate in something, to be on time and to perform as good as they can. As an interpretation, this should support the findings of the present study as the group which needed to pay for access to the WordDive mobile language studies progressed significantly faster in their studies and studied longer periods of time than the free group. This means that paying for the service increased their motivation. The act of paying increases someone's level of commitment in a similar way as being paid for one's participation with the difference that having to actually pay should enhance the motivation even more. This was the outcome of the WordDive mobile study participants' data.

In another study, Dawes (1988) told his participants a story of two people who had paid \$100 for a weekend stay at a resort. While they were travelling to their destination, both of them felt a bit sick and thought of the option to rather turn back and rest at home. The fee of \$100 would then be lost. The question assigned to the participants of the study was if the two people should turn back or drive to the resort. Most of the participants answered that the two people should continue their journey and stay at the resort even if they felt unwell. Their reasoning was to avoid losing the \$100 fee. This means that having paid for a certain service increases the commitment of people to actually make use of it in order to avoid having wasted one's money. As the outcome from Dawes shows, this applies even in situations when making use of a paid service is connected with being uncomfortable. For the usage results of the paid and free licence groups, this explains why the paid group practiced longer and more efficiently with the WordDive Mobile Application. They had paid to get access to the service and therefore did not want to waste that payment. However, it does not account for the more frequent usage of the application per week and per day which was found for the free licence group. Maybe this finding can be explained as a sort of payment which was received by the learners as they got the usual fee for the WordDive study material for free. Considering this option, a recent study by Scott-Clayton (2011) adds further support to the theory. She found that financial incentives for academic achievement helped to increase the students' motivation and study scores. For the WordDive Mobile Application users this means that their prospect of avoiding costs could also have acted as a reinforcement for their study motivation resulting in the higher usage frequencies for the free-of-charge users.

The finding that the paid group studied significantly more with the hard exercise mode and the free group with the medium exercise mode can be explained by the fact that the paid group most likely had more recent experience in using the WordDive Mobile Application as they had an active licence when the data for this study was collected. Therefore they were actively engaged in their studies and interested to achieve higher points and faster results which is possible with the hard exercise mode. The free group, however, was just trying the mobile application and maybe did not intend to gain the best possible outcome. Moreover, they had not studied with WordDive for a while and thus might have needed to get familiar with the study material. In this special case, the less

demanding exercise mode in form of the Medium mode is more suitable as it avoids frustration and makes it easier to find the correct answer. Therefore, the result is in line with what should be expected from more advanced, regular users or beginners.

### **5.1.6 Discussion and Evaluation of UEQ Scores**

In the next paragraphs, the results from the UEQ will be evaluated and discussed. The UEQ is a tool to measure the user experience of a service. Analysis of the UEQ was done with focus on the culture of the participants, the age group, possible gender differences and correlations with the Big Five personality factors.

The evaluation of culture showed that the Finnish group submitted the lowest ratings on all six dimensions of the UEQ – Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation and Novelty. The Russian group granted the highest ratings and the English group was between the Finnish and Russian group. This finding can be explained through the cultural background of the groups. For the Finnish and English groups, representing a more Western culture also leads to being more critical and analytic in their evaluation. The Russian group could have more Eastern influences and therefore hesitate to give bad ratings and follow a more holistic approach. Vatrappu and Suthers (2007) described these cultural differences in their study.

Egmond et al. (2013) describe Eastern cultures to be more humble compared with Western cultures which focus on the cognitive aspects of learning. Therefore, the more Western-oriented cultural groups of this thesis could have rated the WordDive Mobile Application a bit lower because they are more willing to analyse and criticize than Eastern cultures are.

However, other research has found the opposite results when comparing Asian and Western cultures and their rating of a mobile learning application. Hsu (2013) found that Asian participants submitted the lowest ratings of a mobile assisted language learning solution, whereas Westerners rated it higher. For this thesis, the Russian group was closest to Eastern cultures. This does not necessarily mean that the Russian group can be completely identified as an Eastern culture group. There can be substantial differences in their appreciation and attitude towards the use of technology for language learning. As this thesis produced results in the UEQ which contradict the findings of Hsu (2013), it should be taken into account that Asian and Russian cultures might have certain shared characteristics but also differ in other characteristics. In order to further explore this issue, future research including an Eastern group of for example Chinese students has to be compared with a Russian group in order to find possible differences in their appreciation and evaluation of mobile learning and the usage of the WordDive Mobile Application.

Concerning the age groups, the UEQ ratings produced a statistically significant difference in the ratings of the young, middle and old groups. The results show that the young group gave the lowest rating scores for the WordDive Mobile Application followed by the old group. The middle-aged group submitted the highest ratings. This finding can be explained by the fact that the young group is most likely very much accustomed to the usage of mobile applications for various purposes and therefore submitted lower ratings



as the WordDive Mobile Application was just one out of many different applications for them. For the old group, the WordDive Mobile Application for language learning is most likely something special and new and thus they rated it higher. The middle-aged group might be familiar to mobile usage for their professional life. Bianchi et al. (2005) found that younger people have a more emotional connection to their mobile application usage whereas older people use their mobile phone mainly for professional purposes. This could explain the higher rating of the WordDive Mobile Application by older and middle-aged participants in this thesis as for them it is something novel to use their mobile phone for their leisure activities.

Additionally, the young group had practiced the least amount of time and the older and middle group had used the WordDive Mobile App more frequently and for longer durations. From a psychological point of view, it has been shown that people like those things more which they see and interact with more often. Zajonc (1968) found in his study that being exposed to a certain stimulus more frequently than to another made people change their attitude towards that stimulus. His participants preferred those symbols which they had been presented with more often during the experiment. Therefore, the mere increase in the usage frequency and usage time might add to an increased liking and better rating of the WordDive Mobile Application.

Concerning gender, no statistically significant differences could be found for the ratings obtained via the UEQ. However, Viberg and Grönlund (2013) found that female participants had a more positive attitude towards the usage of mobile devices for language learning than male participants. This is in contradiction with the current results of this thesis. It has to be pointed out that Viberg and Grönlund had not used the UEQ as a rating tool which might have produced different results. It seems that gender effects are rather contradictory in the field of mobile language learning. Therefore, more research including the investigation of gender differences in mobile language learning has to be conducted.

Personality differences in the rating of the UEQ were found to be of a consistent nature. Extraversion and Openness were related positively to all rating dimensions of the UEQ whereas Agreeableness, Conscientiousness and Neuroticism produced negative correlations with all UEQ rating dimensions. As stated above in section 5.1.3, Extraversion is connected to being emotionally warm, Openness to being more curious and willing to learn. This could explain why participants scoring higher in these two personality factors also rated the WordDive Mobile Application higher. Agreeableness is associated with following rules and staying out of trouble, Conscientiousness with a higher level of discipline and achievement motivation, and Neuroticism with a lack of trust and emotional stability. Considering these definitions by Komarraju et al. (2009), it should be expected that participants scoring higher in Agreeableness and Conscientiousness would also rate the WordDive Mobile App higher. This has not been the case. High levels of these two personality factors produced lower ratings of the WordDive Mobile App. However, only two of these 12 ratings reached statistical significance. Therefore these findings can be merely coincidental. Neuroticism was

associated with lower ratings of the WordDive Mobile Application which is in accordance with the expectation that more neurotic people would be more critical and less trusting.

In addition, Laugwitz et al. (2008) also state that the usage of the UEQ is recommended in combination with a live usability test. That means that the UEQ might produce only hints towards the real user experience and usability of a tool or service and its results should be confirmed by other instruments. In the light of the present study, this suggests the necessity of future research in order to further investigate the WordDive Mobile Application in terms of user experience and usability. (Laugwitz et al., 2008)

## **5.2 Implications for Future Application Development of WordDive**

The WordDive Mobile Application aims at learning a new language. In that particular field, Yamada et al. (2014) showed that the learner's interest in the topics of the vocabulary they tried to learn improved their learning outcome significantly. Furthermore, being interested in the vocabulary also helped the learners to keep learning for longer periods of time and to not drop out of the learning process. This finding is essentially important for the WordDive Mobile Application as the goal should be to keep people studying and coming back later to continue their language studies. For future development, including a wider range topics for the learner to select from might help the learner to find a topic they are interested in and thus to continue their studies with WordDive.

Another important factor for the WordDive Mobile Application is the game value. According to Butler et al. (2014), there are differences in the appreciation of an online language learning game. Good online language learning games should offer cognitive challenge, evoke the learner's curiosity, offer a certain level of control and involve multiple players. The WordDive Mobile App gives the user some control as they can select from different exercise modes – Easy, Medium and Hard mode. However, significant differences for the usage of the exercise modes were found only for the licence type groups. The result that paying customers seem to prefer the Hard mode implies that this mode is of major significance for the users' study process. Having a look at the usage frequencies shows that 50% of all exercises performed during data collection for this thesis were completed with the Hard mode, 31% of exercises were done using the Medium mode and 19% only with the Easy mode. Therefore, people seem to overall prefer typing the answer instead of selecting the whole word but they still use all three modes.

For WordDive, this means that all modes are important to the user but the Hard mode is the most valuable. There is already some gamification value and all of the game modes are important to the users. The fact that no significant differences were found for the exercise modes is actually a good result for WordDive as it suggests that all modes are used by all participants without a clear preference depending on their age, culture, gender or other factors. As the application combines pictures and descriptions to find out a word, it also appeals to the users' curiosity and makes them want to discover the correct word. The WordDive Mobile Application offers different levels of cognitive demand in

the form of the three different modes as mentioned above. The only aspect it is lacking up to this moment is the possibility to interact with multiple players. This could be one issue to consider for future development, even if it was only at a level of perhaps offering a multiple chat for users or the possibility to compare one's results with the other users or create challenges for a friend who also uses WordDive. These are just a few suggestions among a vast amount of options for future development.

The research conducted by Butler et al. (2014) involved online language learning games aimed at learning new vocabulary and expressions. These games are comparable to WordDive's method which also teaches mostly vocabulary and expressions as well as some grammar in the web version. However, Butler et al. found that these sort of games are not a suitable preparation for more complex language tests. According to their findings, students reached good scores in tests where they needed to fill in gaps but bad scores in tests where more high-level language skills were demanded. This has to be taken into account for the WordDive Mobile Application in terms of the goals of its users. Online games can help to achieve a certain level of expertise but for more advanced tasks further methods are needed. It has to be pointed out that WordDive already offers a number of grammar courses and pages on grammar rules. These grammar courses are not supported by the mobile application and therefore out of reach for those students who want to reach higher by solely using their mobile device. For future development, WordDive might consider to also add these grammar course functionalities to their mobile application to grant access to deeper and more advanced language learning also for their users who rely only on the mobile application.

Regarding gender differences in the field of language learning, Pawlak (2013) found that female language learners consciously connect the sound of an English word to an image of the word to improve their ability of remembering the word. This strongly supports the strategy involved in learning a language with WordDive as the WordDive Mobile App – and also the website version – employ the usage of the word's pronunciation and sound in connection with a picture representing the word. Therefore, the WordDive Mobile App might implicitly support the conscious usage of a strategy like the one described by Pawlak, for both male and female learners. Due to women's higher likelihood of actually making use of learning strategies, this might support especially female participants in their learning and therefore explain their better results compared to the male participants in the results of this thesis. For future development, WordDive might therefore consider making this implicitly available strategy more visible for their learners. A simple hint showing in the exercise progress and telling the users to actually listen to and repeat the vocabulary items and sentences aloud could be sufficient. If needed, also some explanation on why this is beneficial for the learning progress might encourage people to follow the instructions. This should be done for learners of both genders as other past research produced less clear findings in terms of gender and the usage of learning strategies.

Another study on online language learning and gender by Hulick (1998) suggests that female learners' cognitive abilities are better in auditory processing and processing

speed for young females and in visual processing for older females. Therefore, the WordDive Mobile Application implicitly supports the female learner group in their language studies as their abilities match the requirement of language learning with WordDive. As future development implication, this means that WordDive should consider the role of their male learners more and try to also enhance their learning. As males develop better quantitative skills according to Hulick, this could be a source of learning improvement for male students. However, it might be hard to include quantitative abilities into language learning with WordDive and therefore other possibilities should have priority.

The results of this thesis in terms of age and learning outcome were in line with the findings of Noll and Horn (1998), suggesting that young learners are both faster and more efficient in their language learning than older learners due to the fact that their cognitive abilities change with age. For the WordDive Mobile App this means that older people will inevitably require more study time to foster their language skills whereas younger people, especially during the age of 14-29 will need only little time to achieve their goals. This should be considered in the design of the courses and offered course durations. For example, WordDive could – depending on the customer's age – automatically adjust the learning speed and amount of new material being presented to the user during one learning session to perfectly match the person's age-related learning and processing abilities. By doing so, each customer could be served a tailored learning tool which would support their abilities and thus avoid frustration or boredom.

However, Bower (1975) proposes that the fluid intelligence involved in short-term memory is also connected to the crystallized intelligence involved in long-term memory. The reason for this is the fact that it is necessary to first store information in the short-term memory in order to later be able to transfer it to the long-term memory. The consolidation of the material in the short-term memory is thus an essential requirement for the possibility to transfer it to the long-term memory. This theory supports the learning strategy applied by the WordDive Mobile Application as it aims at long-term storage of the learnt study items. Considering Bower's (1975) implications the WordDive Mobile Application might be able to attenuate the effects of decreasing fluid and increasing crystallized intelligence abilities with age as both are required for permanent learning as supported by WordDive. This is an important finding as it suggests that WordDive has the ability to cross the gap which arises between different age groups if the WordDive Mobile Application will be able to further support permanent learning. For future research in this concern, it might be useful to investigate if older people and younger people can reach the same level of permanent, long-term memory storage of the learnt material. This could for example be tested by examining both age groups' ability to remember the learnt material months or even years after the learning has taken place and the study items were rated as permanently learnt by WordDive. A simple means of doing this could be to just arrange a short "learning check" every six months for each user and then compare the results of these checks across age groups.

It has to be noted that at the time of data collection, the user interface for the WordDive Mobile Application version 1.4 was only available in English (WordDive Mobile, 2014). This may have impacted especially the older participants' learning outcome as for them understanding the English user interface could have been more challenging. However, this problem has been solved with the latest release of the WordDive Mobile Application in version 2.0 where other UI languages have been made available.

In terms of personality findings of this thesis, most of the results were in accordance with previous research. Extraversion and Neuroticism seem to hinder successful learning whereas Agreeableness, Conscientiousness and Openness seem to foster positive learning effects. It is hard to suggest any concrete implications for the future development of the WordDive Mobile App in consideration of the personality findings of this thesis. However, it would be beneficial for students with higher levels of Agreeableness and Conscientiousness to have clear rules and instructions which can be followed easily and to ease the planning and scheduling of one's studies with WordDive. That way, those learners who have higher personality scores on the factors influencing positive learning outcomes would perceive lower levels of stress and effort in the organization and execution of their studies with the WordDive Mobile Application. Create clear ways to schedule the single study sessions and to set personal study goals. Give visible access to study instructions and explanations so that finding these does not impose additional load on the learners. Clear structures, rules and study planning tools will already do most of the work for high Agreeableness, Conscientiousness and Openness learners who use the WordDive Mobile Application for their language studies. The same solution would also benefit those people with the opposite personality type, as for them WordDive could work as a compensation tool to help them structure their studies and keep a steady learning rhythm. Simple notifications via text message or email could do the trick and keep those people who have troubles to organize their studies following their weekly learning schedule.

Motivation is another factor which was found to play a role in language learning. As Krug and Brower (2014) showed in their study, the act of receiving payment increases one's motivation to perform as good as possible. For the WordDive Mobile Application and its future development this means that the learners should not receive material for free if focused and successful study outcomes are intended. The fact that the free-licence participants actually used the app more often per day and week but performed worse than the group which had paid for the service further supports this suggestion. Free studies might increase the likelihood to open the application and play a bit, but it decreases the likelihood of efficient studying. This finding should be pointed out to language learners. In nowadays redundant availability of free-of-charge study material it is actually the paid material which does the trick for the learner despite the possible additional effect of superior quality of the material provided. Paying for the service increases the study motivation and also the outcome of learners using the same service when having paid as compared to a free-licence group. This is an important finding for language learners.

Concerning motivation, the level of excitement of an online solution for language learning should also be taken into account. Butler et al. (2014) found that motivation was an important factor for online language learning. They also pointed out that over-attractiveness and over-excitement in an online language learning game might hinder learning. It is therefore important for WordDive to consider that their online language learning service should not be too much fun but also not too boring. Keeping this balance might be one key element to also keep the users' motivational levels high and guarantee learning success. One solution might be to add some gamification elements like special rewards when the learner reaches a certain amount of points. This reward could be to unlock a new field of study items. That way, the learner has a goal which is connected to the points he or she collects and this could keep them motivated to do their best in their language studies. However, for each course there should not be too many such locked group of study items as otherwise those users who will not reach this group would have major disadvantages. One way to avoid this problem could be to simply give access to those slower learners after they have finished the regular material. With this solution, those who learn fast and achieve more points get rewarded with extra material immediately and also those who are slower get the chance to access extra material later when they are ready for it.

Another issue which has to be considered in the field of online services is privacy protection. Yamada et al. (2014) found that participants were concerned about their personal data which they enter online, even if it was just their preference settings of the online learning tool. This is an important issue to a company like WordDive providing solely online services for language learning. In order to keep their customers and gain new ones, it has to be made clear that the data the customers enter is protected and will not be passed on to others. Customers seem to take this issue very seriously and therefore it is worth considering, also for the WordDive Mobile Application. (Yamada et al., 2014)

The most important recommendations for future development are summarized in table 5 together with a short description of their objectives.

**Table 5.** Most important recommendations and objectives for the WordDive Mobile Application development.

Recommendation	Objective
<ul style="list-style-type: none"> <li>▪ Offer a wider variety of topics</li> <li>▪ Add interaction functionality</li> <li>▪ Provide more advanced exercise types</li> <li>▪ Add learning strategy hints</li> <li>▪ Add age-related adjustments of progress</li> <li>▪ Provide clear instructions for learning, reminders</li> <li>▪ Add hidden course parts</li> <li>▪ Enhance privacy protection and visibility</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improve learning outcome and motivation</li> <li>▪ Increase motivation</li> <li>▪ Reach more advanced language learners</li> <li>▪ Improve learning outcome</li> <li>▪ Enhance learning experience depending on the learner's age</li> <li>▪ Support different personality types in their studies</li> <li>▪ Reward fast learners</li> <li>▪ Gain the customers' trust</li> </ul>

In the following section, open issues and questions raised in this thesis will be presented and discussed.

### **5.3 Open Issues and Questions for Future Research**

One area resulting in rather heterogeneous results is the area of gender effects and learning. Pawlak (2013) points out that especially for the field of gender research there are various past findings which do or do not hint to a connection between a person's gender and their learning strategies. He suggests that culture or education could be factors influencing these differing results. The current thesis work included the factor of culture but not the one of education. Therefore, future research should take into account also the learner's educational level when investigating online language learning.

Concerning a person's age and its consequences on their language learning abilities as suggested by the results of this thesis, the fact that crystallized intelligence correlates positively with age should also be taken into account. The courses of WordDive have to be designed in a way to support the thinking and reasoning patterns people have learnt during their adulthood as these are getting stronger with each year of age. This was found by Noll and Horn (1998) and has impact especially on the older but possibly also on the middle age group of WordDive language learners, meaning the age from about 30 years onwards. As this group contains 67% of the WordDive mobile users of this thesis, this does have a rather important impact on the usage of the WordDive Mobile Application. Therefore, it should be considered when developing the flow and usage patterns of the mobile application in order to adjust them to people's common expectations and patterns of interaction with language learning. To be able to specify the most important common patterns, another study would be necessary to identify these patterns and their level of impact.

In terms of personality assessment, this thesis relied on self-reported evaluations. This could be one reason why some personality-related findings were not in accordance with other present research. Gramzow et al. (2003) state that for self-reporting scales a certain amount of error has to be expected. This can be either due to memory constraints of the reporting person or due to wrong self-estimation. It can be hard for a person to judge themselves in terms of their personality or recall the exact usage and performance of a tool like the WordDive Mobile App. Therefore, the results of the TIPI and also the UEQ have to be considered with caution. However, it is not possible to measure ratings of the user experience or a person's personality without asking the person themselves to state their opinion or estimation. So a certain level of error has to be accepted as part of research in the field of personality and user experience evaluation.

According to Studenska (2007), the role of emotions should not be left aside when investigating the maintaining and fostering of study motivation in language learning. This factor was not included in the present research of this thesis and therefore should be considered in future research.

One problem which has been pointed out in this and previous research is the difficulty to define culture. There are more than 200 different definitions of culture. Vatrappu and Suthers (2007) state that culture is a concept involving beliefs, knowledge, morals, law, customs and other dimensions which are typical for a member of a society. Given that assumption, the cultural groups of this thesis were selected on the basis of the peoples' language grouping and no information on their beliefs or morals was available. Therefore, it is possible that the cultural groups are only partly representative of the Finnish, Russian or English culture. This limitation could be overcome in the future by assessing also the participants' moral attitudes, beliefs and shared knowledge.

According to Hofstede (1997) culture is "the collective programming of the mind which distinguishes the members of one group or category of people from another". This definition also suggests a strong connection between culture and the mind set of people and therefore limits the findings of this study in terms of cultural interpretations. However, this study has taken into account also the cultural group's opinions and views about the usability and user experience of the WordDive Mobile Application and was able to show cultural differences between the Finnish, Russian and English groups. Therefore the cultural grouping of this thesis was confirmed by the UEQ results. This can be one indicator of the validity of the cultural grouping of this thesis and strengthens the cultural interpretations made in section 5.1.1 of this thesis.

All these issues and future development suggestions stated above are related to the findings of this study with the usage of the WordDive Mobile Application v. 1.4. However, in the latest version number 2.0 currently available, the WordDive Mobile Application supports different languages for the user interface. Other improvements made in the new version are a visually more attractive look of the buttons and faster response times. The WordDive Mobile Application has therefore already been developed in order to avoid certain issues which arose in version 1.4. However, there is still room for further improvement and maybe the results of this thesis can contribute to the future development of the WordDive Mobile Application. It is clear that not all the proposals made in this thesis can be realized but possibly some of the results point towards certain directions for future improvement.



## 6 Conclusion

All the results and open issues mentioned in the sections above will be summarized in the following paragraphs.

The research questions of this thesis shall be addressed first. Research question number one, which aimed at investigating if there is any difference in the usage of the WordDive Mobile Application concerning the exercise duration, amount of exercise tries, speed of progress for the exercises, selected exercise mode, amount of exercises performed per day and amount of exercises completed per week for people with different cultural backgrounds, age groups, gender, licence types (free courses versus paid courses) and Big 5 personality factors can be largely answered positively. Statistically significant differences were found for the usage variables in regard of the age groups, licence types, gender, culture and personality of the participants. The most important results will be outlined in the sections below.

The study revealed significant differences gender resulting in a faster speed of progress for female participants and higher amounts of exercise duration, tries, exercises per day and week for male participants. These findings are in line with established findings pointing at women's better linguistic skills and therefore a higher amount of practice needed by men in the area of language studies (Eysenck et al., 2005).

As for the age groups, the youngest participants produced the highest speed of progress using the least amount of time, tries, exercises per day and week. The oldest group however needed the longest mobile application usage to achieve the second best speed of progress. These results conform to other findings in the field of age differences in learning abilities. The ability to concentrate and remember learned material fast declines with advancing age as a result of a decline in fluid intelligence with age (Noll and Horn, 1998). Therefore, the older a person becomes, the more practice is needed to achieve a good result in their language learning. For young people it means that they can achieve very good learning results with a lower investment of time and effort. These findings were confirmed by the outcome of this thesis.

The personality of a person plays a big role in their academic success and learning behaviours, too. Success in a person's studies correlates highly with positive scores on the Big Five factors Conscientiousness, Agreeableness, and Openness. The factors Neuroticism and Extraversion are negatively correlated with a person's study success. (Komarraju et al., 2009; Payne et al., 2007)

In this thesis, high scores in Neuroticism and Extraversion produced significant negative correlations with four to five out of six mobile application usage variables whereas high scores in Conscientiousness, Agreeableness and Openness were positively related to most of the usage variables. Being more open and interested, as well as more disciplined adds to a person's academic success. This was largely supported by the findings of this study.

Concerning a person's cultural background, the results of this research point towards the existence of cultural differences in mobile language learning behaviour. The Russian group was most eager to study and completed the largest amount of exercises. The Finnish group was fastest and most efficient. The English group was most motivated and invested the highest amount of time. This result is interesting in the sense that it raises the question if a mobile application designed by Finnish people is in fact more suitable and efficient tool for Finnish learners compared to other cultural groups. However, in order to further investigate this finding, more participants for the Russian and English groups and a more homogenous group composition of the English group would be necessary.

The licence type generated differences in the direction of a more frequent mobile application usage by the free licence group and a more efficient and learning success motivated use by the paid group. Viewing this result from the angle of motivational psychology, paying money for a service increases a person's motivation to get the most out of it and not waste the paid fee (Dawes, 1988). Therefore, WordDive learners who get courses for free might be less motivated to actually achieve their learning goal than those who pay to use the service. This finding could also be related to the fact that those people who pay for access to the WordDive language courses on the mobile application are already highly motivated and therefore paying the fee might add to their motivation or keep it up for the duration of their paid studies. Getting access for free seems to make people want to try it out but does not motivate them to actually profit from the usage and achieve a serious learning outcome. This finding is relevant both from a business point of view and from a psychological perspective.

Research question two of this thesis focussed on the user experience rating of the WordDive Mobile Application and the question if any differences exist between cultures, genders, age groups or the personality according to the Big Five factors. This question can be answered positively and the most important findings are summarized below.

User experience ratings of the WordDive Mobile Application produced clearly higher scores for older and middle-aged people compared to young learners. Especially the factors attractiveness, novelty, stimulation and efficiency were rated significantly higher by middle-aged than by young people. Interestingly, Finnish people who – as mentioned above – benefitted most from the usage of the WordDive Mobile Application gave the lowest ratings across all categories. Russians issued the highest ratings across all categories and English were in between. Maybe the habits and rules of Western culture contributed to the Finnish and English groups' modest ratings as Westerners are more likely to criticise and analyse than Eastern cultures. Therefore, Russian people might show certain Eastern cultural aspects of humbleness in their higher ratings (Egmond et al., 2013). Given this assumption, the cultural rating differences might not be related to a perceived difference in the user experience of the WordDive Mobile Application but to a difference in cultures. For a deeper insight in the user experience of the mobile application, studies involving usability tests are needed in order to directly see and hear people's problems and preferences.

All these results pointed at several improvement suggestions for the WordDive Mobile Application. In its latest version from March 2015, the WordDive Mobile Application now supports different user interface languages. This might increase the efficiency of studies also for the other culture groups. Another aspect is the implication from personality findings. Keeping people motivated to study and raising their curiosity is important for WordDive. This can be achieved by adding more exercise types to the application. At this moment, only the regular courses are supported by the WordDive Mobile Application. Gamification is a complicated path, especially for language learning solutions. The application has to provide some motivating and curiosity-raising elements, but a too large level of excitement can also prevent learning from happening (Butler et al., 2014).

Furthermore, WordDive could take into consideration the differences found for different age groups. Having young customers who are really fast learners is good as they can achieve good results in a relatively short time. However, also the older customers should be supported who need more time in their studies. Finding a solution to support both is a challenge. WordDive already provides its users with a target setting option where they can choose how long and much they want to practice. Additionally, WordDive also adjusts the speed of progress for each user to the optimal level. However, for fast learners, more course material and topics are needed. Providing a larger variety of topics can also help slower learners to select those topics they are interested in and therefore increase their study progressing speed as shown by Yamada et al. (2014). As stated above, those participants who paid for the service were more motivated to achieve good results whereas the free group just tried it out and did not study as seriously as the paid group. This is important for WordDive to consider when giving away study time for free. A certain amount added to the paid amount might be a useful strategy whereas completely free-of-charge material might not be beneficial. All these points raised by the research of this thesis play a role in improving the WordDive Mobile Application for all its users from different age groups, cultures and personalities.

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## 8 Appendices

### 8.1 Appendix A. The Invitation for Participation in the Study.

#### **Invitation in English for people with a paid WordDive licence:**

Subject: Participation in the WordDive Mobile Application Study

Dear WordDive Mobile User,

I received your contact information from the WordDive user database.

My name is Stefanie and I am currently conducting my Master's Thesis at the University of Tampere, Finland. The topic of my thesis is human-technology interaction with WordDive Mobile as the case application. Special focus will be placed on usage across different countries and on the users' perception of the app.

Your help with the data collection would be very valuable for my thesis. All you need to do is to give your permission for the information collection by accepting the consent form:

#url#

Please use the following login details:

User name: #tunnus#

Password: #salasana#

After submitting the agreement form, just use your WordDive Mobile application as you always do. No special actions are required. Two weeks from now I will send you a short questionnaire (only 2-3 min to complete) about how you liked using the WordDive mobile application and also some questions about yourself. All the data collected for my study will be treated confidentially and published only on a summary level.

The results of the study will be published as a Master's Thesis by the end of the year and in summary form in the WordDive blog.

Thank you very much for your participation and help!

Stefanie Scheid  
School of Information Science  
University of Tampere  
[stefanie.scheid@uta.fi](mailto:stefanie.scheid@uta.fi)

#### **Invitation in English for people without a WordDive licence receiving 4 weeks for free in return for their participation:**

Subject: Participation in the WordDive Mobile Application Study

Dear WordDive Mobile User,

I received your contact information from the WordDive user database.

My name is Stefanie and I am currently conducting my Master's Thesis at the University of Tampere, Finland. The topic of my thesis is human-technology interaction with WordDive Mobile as the case application. Special focus will be placed on usage across different countries and on the users' perception of the app.

Your help with the data collection would be very valuable for my thesis. In order to participate, you will get a 1-month licence for WordDive Mobile for free. All you need to do is to give your permission for the information collection by accepting the consent form:

#url#

Please use the following login details:

User name: #tunnus#

Password: #salasana#

After submitting the agreement form, the licence will be added to your WordDive account within 1 day's time. Use the WordDive Mobile application as you naturally would. No special actions are required. Two weeks from now I will send you a short questionnaire (only 2-3 min to complete) about how you liked using the WordDive mobile application and also some questions about yourself. All the data collected for my study will be treated confidentially and published only on a summary level.

The results of the study will be published as a Master's Thesis by the end of the year and in summary form in the WordDive blog.

Thank you very much for your participation and help!

Stefanie Scheid  
School of Information Science  
University of Tampere  
[stefanie.scheid@uta.fi](mailto:stefanie.scheid@uta.fi)

### **Invitation in Finnish for people with a paid WordDive licence:**

Subject: Osallistu WordDiven mobiilisovellustutkimukseen

Hyvä WordDiven mobiilikäyttäjä,

Sain yhteystietosi WordDiven käyttäjätietokannasta.

Nimeni on Stefanie ja teen parhaillaan pro gradu -tutkielmaani Tampereen yliopistossa. Tutkielmani aiheena on ihmisen ja teknologian vuorovaikutus, ja käytän WordDiven mobiilisovellusta tutkimuskohteena. Tutkimukseni painopiste on erityisesti sovelluksen käytössä eri maissa sekä siinä, millaiseksi käyttäjät kokevat sovelluksen.

Tutkielmani kannalta olisi erittäin hyödyllistä, jos voisit auttaa tutkimusaineiston keruussa. Sinun ei tarvitse tehdä muuta kuin antaa lupa tiedon keräämiseen hyväksymällä alla oleva suostumuslomake:

#url#

Käytä seuraavia sisäänkirjautumistunnuksia:

Käyttäjätunnus: #tunnus#

Salasana: #salasana#

Lähetettyäsi suostumuslomakkeen sinun tarvitsee ainoastaan käyttää WordDiven mobiilisovellusta tavalliseen tapaan. Mitään erityistä ei tarvitse tehdä. Kahden viikon kuluttua lähetän sinulle lyhyen kyselylomakkeen (täyttämiseen menee vain 2-3 min), jossa kysytään, mitä pidit WordDiven mobiilisovelluksen käytöstä sekä muutama asia sinusta itsestäsi. Kaikki tutkimustani varten kerätty aineisto käsitellään luottamuksellisesti ja julkaistaan ainoastaan yhteenvedon muodossa.

Tutkimuksen tulokset julkaistaan pro gradu -tutkielmana vuoden loppuun mennessä sekä yhteenvetona WordDiven blogissa.

Kiitos paljon osallistumisestasi ja avustasi!

Stefanie Scheid

Informaatiotieteiden yksikkö

Tampereen yliopisto

[stefanie.scheid@uta.fi](mailto:stefanie.scheid@uta.fi)

**Invitation in Finnish for people without a WordDive licence receiving 4 weeks for free in return for their participation:**

Subject: Osallistu WordDiven mobiilisovellustutkimukseen

Hyvä WordDiven mobiilikäyttäjä,

Sain yhteystietosi WordDiven käyttäjätietokannasta.

Nimeni on Stefanie ja teen parhaillaan pro gradu -tutkielmaani Tampereen yliopistossa. Tutkielmani aiheena on ihmisen ja teknologian vuorovaikutus, ja käytän WordDiven mobiilisovellusta tutkimuskohteena. Tutkimukseni painopiste on erityisesti sovelluksen käytössä eri maissa sekä siinä, millaiseksi käyttäjät kokevat sovelluksen.

Tutkielmani kannalta olisi erittäin hyödyllistä, jos voisit auttaa tutkimusaineiston keruussa. Osallistumista varten saat ilmaiseksi 1 kk:n käyttöoikeuden WordDiven mobiilisovellukseen. Sinun ei tarvitse tehdä muuta kuin antaa lupa tiedon keräämiseen hyväksymällä alla oleva suostumuslomake:

#url#

Käytä seuraavia sisäänkirjautumistunnuksia:

Käyttäjätunnus: #tunnus#

Salasana: #salasana#

Lähetettyäsi suostumuslomakkeen lisenssi lisätään WordDive-tilillesi yhden päivän kuluessa. Käytä WordDiven mobiilisovellusta kuten muutenkin tekisit. Mitään erityistä ei tarvitse tehdä. Kahden viikon kuluttua lähetän sinulle lyhyen kyselylomakkeen (täyttämiseen menee vain 2-3 min), jossa kysytään, mitä pidit WordDiven mobiilisovelluksen käytöstä sekä muutama asia sinusta itsestäsi. Kaikki tutkimustani varten kerätty aineisto käsitellään luottamuksellisesti ja julkaistaan ainoastaan yhteenvedon muodossa.

Tutkimuksen tulokset julkaistaan pro gradu -tutkielmana vuoden loppuun mennessä sekä yhteenvetona WordDiven blogissa.

Kiitos paljon osallistumisestasi ja avustasi!

Stefanie Scheid  
Informaatiotieteiden yksikkö  
Tampereen yliopisto  
[stefanie.scheid@uta.fi](mailto:stefanie.scheid@uta.fi)

### **Invitation in Russian for people with a paid WordDive licence:**

Subject: Участие в исследовании о мобильном приложении WordDive

Уважаемый пользователь мобильного приложения WordDive!

Я получила Вашу контактную информацию из базы данных пользователей WordDive.

Меня зовут Стефани, и в настоящее время я пишу диссертацию в Университете Тампере, Финляндия. Тема моей дипломной работы – «Взаимодействие человека и техники на примере приложения WordDive». Особое внимание будет уделяться отличиям в его использовании в разных странах и общему восприятию приложения пользователями.

Ваша помощь в сборе данных была бы крайне полезна для моей диссертации. Все, что вам нужно сделать, это дать свое разрешение для сбора информации, одобрив форму согласия:

#url#

После заполнения формы соглашения, просто пользуйтесь приложением WordDive Mobile, как вы всегда это делаете. Никаких специальных действий не требуется. Две недели спустя я пришлю вам небольшую анкету (потребуется всего 2-3 мин Вашего времени для заполнения). Вам нужно будет оценить свой опыт использования мобильного приложения WordDive, а также ответить на некоторые вопросы о Вас. Все данные, собранные для моего исследования, будут рассматриваться конфиденциально. Опубликованы они будут только в обобщенном виде.

Результаты исследования будут опубликованы в диссертации магистра в конце года и в краткой форме в блоге WordDive.

Большое спасибо за Ваше участие и помощь!

Стефани Шайд  
Кафедра информатики Университета Тампере  
[stefanie.scheid@uta.fi](mailto:stefanie.scheid@uta.fi)

**Invitation in Russian for people without a WordDive licence receiving 4 weeks for free in return for their participation:**

Subject: Участие в исследовании о мобильном приложении WordDive!

Уважаемый пользователь мобильного приложения WordDive!

Я получила Вашу контактную информацию из базы данных пользователей WordDive.

Меня зовут Стефани, и в настоящее время я пишу диссертацию в Университете Тампере, Финляндия. Тема моей дипломной работы – «Взаимодействие человека и техники на примере приложения WordDive». Особое внимание будет уделяться отличиям в его использовании в разных странах и общему восприятию приложения пользователями.

Ваша помощь в сборе данных была бы крайне полезна для моей диссертации. В качестве благодарности за участие Вы получите лицензию на обучение в WordDive Mobile – 1 месяц бесплатно! Все, что вам нужно сделать, это дать свое разрешение для сбора информации, одобрив форму согласия:

#url#

После заполнения формы соглашения, Вам по электронной почте будет выслан лицензионный ключ. Активируйте лицензию и пользуйтесь приложением WordDive Mobile, как бы Вы это делали в обычных условиях. Никаких специальных действий не требуется. Две недели спустя я пришлю вам небольшую анкету (потребуется всего 2-3 мин Вашего времени для заполнения). Вам нужно будет оценить свой опыт использования мобильного приложения WordDive, а также ответить на некоторые вопросы о Вас. Все данные, собранные для моего исследования, будут рассматриваться конфиденциально. Опубликованы они будут только в обобщенном виде.

Результаты исследования будут опубликованы в диссертации магистра в конце года и в краткой форме в блоге WordDive.

Большое спасибо за Ваше участие и помощь!

Стефани Шайд  
Кафедра информатики Университета Тампере  
[stefanie.scheid@uta.fi](mailto:stefanie.scheid@uta.fi)

## 8.2 Appendix B. The Consent Form for Participation in the Study.

**Consent form in English for people with a paid WordDive licence:**

### **Participation in the WordDive Mobile Application Study**

#### **Welcome to the WordDive Mobile study!**

By participating, you will help to evaluate the usage and benefits of the WordDive Mobile application.

After submitting the agreement form, just use your WordDive Mobile application as you always do. No special actions are required. **Two weeks from now** I will send you a short questionnaire (only 2-3 min to complete) about how you liked using the WordDive mobile application and also some questions about yourself. All the data collected for my study will be treated confidentially and published only on a summary level.

The results of the study will be published as a Master's Thesis by the end of the year and in summary form in the WordDive blog.

**By checking the box below, you accept the terms stated above.**

☐ I agree to the terms stated above.

**Consent form in English for people without a WordDive licence receiving 4 weeks for free in return for their participation:**

### **Participation in the WordDive Mobile Application Study**

#### **Welcome to the WordDive Mobile study!**

By participating, you will help to evaluate the usage and benefits of the WordDive Mobile application.

After submitting the agreement form, the **licence** will be added to your WordDive account within 1 day's time. Use the WordDive Mobile application as you naturally would. No special actions are required. **Two weeks from now** I will send you a short questionnaire (only 2-3 min to complete) about how you liked using the WordDive mobile application and also some questions about yourself. All the data collected for my study will be treated confidentially and published only on a summary level.

The results of the study will be published as a Master's Thesis by the end of the year and in summary form in the WordDive blog.

**By checking the box below, you accept the terms stated above.**

☐ I agree to the terms stated above.

### **Consent form in Finnish for people with a paid WordDive licence:**

#### **Osallistu WordDiven mobiilisovellustutkimukseen**

#### **Tervetuloa osallistumaan WordDiven mobiilisovellusta koskevaan tutkimukseen!**

Osallistumalla autat arvioimaan WordDiven mobiilisovelluksen käyttöä ja siitä saatavaa hyötyä.

Lähetettyäsi suostumuslomakkeen sinun tarvitsee ainoastaan käyttää WordDiven mobiilisovellusta tavalliseen tapaan. Mitään erityistä ei tarvitse tehdä. **Kahden viikon kuluttua** lähetän sinulle lyhyen kyselylomakkeen (täyttämiseen menee vain 2-3 min), jossa kysytään, mitä pidit WordDiven mobiilisovelluksen käytöstä sekä muutama asia sinusta itsestäsi. Kaikki tutkimustani varten kerätty aineisto käsitellään luottamuksellisesti ja julkaistaan ainoastaan yhteenvedon muodossa.

Tutkimuksen tulokset julkaistaan pro gradu -tutkielmana vuoden loppuun mennessä sekä yhteenvetona WordDiven blogissa.

#### **Ruksaamalla alla olevan valintaruudun hyväksyt yllä mainitut ehdot.**

☐ Hyväksyn yllä mainitut ehdot.

### **Consent form in Finnish for people without a WordDive licence receiving 4 weeks for free in return for their participation:**

#### **Osallistu WordDiven mobiilisovellustutkimukseen**

#### **Tervetuloa osallistumaan WordDiven mobiilisovellusta koskevaan tutkimukseen!**

Osallistumalla autat arvioimaan WordDiven mobiilisovelluksen käyttöä ja siitä saatavaa hyötyä.

Lähetettyäsi suostumuslomakkeen **lisenssi** lisätään WordDive-tilillesi yhden päivän kuluessa. Käytä WordDiven mobiilisovellusta kuten muutenkin tekisit. Mitään erityistä ei tarvitse tehdä. **Kahden viikon kuluttua** lähetän sinulle lyhyen kyselylomakkeen (täyttämiseen menee vain 2-3 min), jossa kysytään, mitä pidit WordDiven mobiilisovelluksen käytöstä sekä muutama asia sinusta itsestäsi. Kaikki tutkimustani varten kerätty aineisto käsitellään luottamuksellisesti ja julkaistaan ainoastaan yhteenvedon muodossa.

Tutkimuksen tulokset julkaistaan pro gradu -tutkielmana vuoden loppuun mennessä sekä yhteenvetona WordDiven blogissa.

#### **Ruksaamalla alla olevan valintaruudun hyväksyt yllä mainitut ehdot.**

☐ Hyväksyn yllä mainitut ehdot.

### **Consent form in Russian for people with a paid WordDive licence:**

#### **Участие в исследовании о мобильном приложении WordDive!**

#### **Добро пожаловать в исследование WordDive Mobile!**

Участвуя в исследовании, вы сможете оценить сильные и слабые стороны приложения WordDive Mobile.

После заполнения формы соглашения, просто пользуйтесь приложением WordDive Mobile, как вы всегда это делаете. Никаких специальных действий не требуется. Две недели спустя я пришлю вам небольшую анкету (потребуется всего 2-3 мин Вашего времени для заполнения). Вам нужно будет оценить свой опыт использования мобильного приложения WordDive, а также ответить на некоторые вопросы о Вас. Все данные, собранные для моего исследования, будут рассматриваться конфиденциально. Опубликованы они будут только в обобщенном виде.

Результаты исследования будут опубликованы в диссертации магистра в конце года и в краткой форме в блоге WordDive.

Установив флажок ниже, вы принимаете условия, указанные выше.

**Установив флажок ниже, вы принимаете условия, указанные выше.**

☐ Я согласен с условиями, указанными выше.

**Пожалуйста, введите свой адрес электронной почты здесь:**

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### **Consent form in Russian for people without a WordDive licence receiving 4 weeks for free in return for their participation:**

#### **Участие в исследовании о мобильном приложении WordDive!**

#### **Добро пожаловать в исследование WordDive Mobile!**

Участвуя в исследовании, вы сможете оценить сильные и слабые стороны приложения WordDive Mobile.

После заполнения формы соглашения лицензия будет добавлена к Вашей учетной записи в WordDive в течение 1 дня. Пользуйтесь приложением WordDive Mobile, как бы Вы это делали в обычных условиях. Никаких специальных действий не требуется. Две недели спустя я пришлю вам небольшую анкету (потребуется всего 2-3 мин Вашего времени для заполнения). Вам нужно будет оценить свой опыт использования мобильного приложения WordDive, а также ответить на некоторые вопросы о Вас. Все данные, собранные для моего исследования, будут рассматриваться конфиденциально. Опубликованы они будут только в обобщенном виде.



Результаты исследования будут опубликованы в диссертации магистра в конце года и в краткой форме в блоге WordDive.

**Установив флажок ниже, вы принимаете условия, указанные выше.**

☐ Я согласен с условиями, указанными выше.

**Пожалуйста, введите свой адрес электронной почты здесь:**

---

### 8.3 Appendix C. The Invitation to Fill in the Usage Questionnaire

#### Invitation in English:

Subject: Questionnaire WordDive Mobile Study

Dear WordDive Study Member,

Thank you for your participation during the last 2 weeks. The mobile application data collection is completed now. As a last step I would ask you to fill in a short questionnaire (it takes about 2-3 min to complete).

You'll find the questionnaire by clicking the following link:

#url#

Please use these login details:

User name: #tunnus#

Password: #salasana#

This is the last part of the WordDive Mobile study for my Master's thesis. Thank you for your help and cooperation!

Stefanie Scheid  
School of Information Science  
University of Tampere  
[stefanie.scheid@uta.fi](mailto:stefanie.scheid@uta.fi)

#### Invitation in Finnish:

Subject: WordDiven mobiilisovellustutkimusta koskeva kysely

Hyvä WordDiven mobiilisovellustutkimuksen osanottaja,

Kiitos osallistumisestasi kahden viime viikon aikana. Tutkimusaineiston keruu mobiilisovelluksesta on nyt päättynyt. Näin lopuksi pyydän sinua täyttämään lyhyen kyselylomakkeen (täyttämiseen menee noin 2-3 min).

Pääset kyselylomakkeeseen klikkaamalla alla olevaa linkkiä:

#url#

Käytä seuraavia sisäänkirjautumistunnuksia:

Käyttäjätunnus: #tunnus#

Salasana: #salasana#

Tämä on viimeinen osa pro gradu -työhöni liittyvää WordDiven mobiilisovellustutkimusta. Kiitos osallistumisestasi ja avustasi!

Stefanie Scheid

Informaatiotieteiden yksikkö  
Tampereen yliopisto  
[stefanie.scheid@uta.fi](mailto:stefanie.scheid@uta.fi)

**Invitation in Russian:**

Subject : Опросный бланк исследования WordDive

Уважаемый участник исследования WordDive!

Спасибо за ваше участие в течение последних 2 недель. Сбор данных мобильного приложения завершается сейчас. В качестве последнего шага я хотела бы попросить заполнить небольшую анкету (займет около 2-3 минут). Вы найдете анкету, нажав на ссылку ниже:  
#url#

Это последняя стадия исследования WordDive Mobile для моей диссертации. Спасибо за Вашу помощь и сотрудничество!

Стефани Шайд  
Кафедра информатики Университета Тампере  
[stefanie.scheid@uta.fi](mailto:stefanie.scheid@uta.fi)

## 8.4 Appendix D. The Questionnaire after Data Collection was Completed

### Questionnaire in English:

#### Questionnaire WordDive Mobile Study

Age: \_\_\_\_\_

Gender:

Male                  Female

☐

☐

Country of birth: \_\_\_\_\_

Country of residence: \_\_\_\_\_

Mother tongue: \_\_\_\_\_

Here are a number of personality traits that may or may not apply to you. Please enter a number next to each statement to indicate the *extent to which you agree or disagree with that statement*. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

1 = Disagree strongly

2 = Disagree moderately

3 = Disagree a little

4 = Neither agree nor disagree

5 = Agree a little

6 = Agree moderately

7 = Agree strongly

#### *I see myself as:*

1. \_\_\_\_\_ Extraverted, enthusiastic.
2. \_\_\_\_\_ Critical, quarrelsome.
3. \_\_\_\_\_ Dependable, self-disciplined.
4. \_\_\_\_\_ Anxious, easily upset.
5. \_\_\_\_\_ Open to new experiences, complex.
6. \_\_\_\_\_ Reserved, quiet.
7. \_\_\_\_\_ Sympathetic, warm.
8. \_\_\_\_\_ Disorganized, careless.
9. \_\_\_\_\_ Calm, emotionally stable.
10. \_\_\_\_\_ Conventional, uncreative.



complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	easy	13
unlikable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	pleasing	14
usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	leading edge	15
unpleasant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	pleasant	16
secure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	not secure	17
motivating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	demotivating	18
meets expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	does not meet expectations	19
inefficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	efficient	20
clear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	confusing	21
impractical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	practical	22
organized	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	cluttered	23
attractive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	unattractive	24
friendly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	unfriendly	25
conservative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	innovative	26

### Questionnaire in Finnish:

#### WordDiven mobiilisovellustutkimusta koskeva kysely

Ikä: \_\_\_\_\_

Sukupuoli:

Mies                      Nainen  
☐                      ☐

Synnyinmaa: \_\_\_\_\_

Asuinmaa: \_\_\_\_\_

Äidinkieli: \_\_\_\_\_

Alla on lueteltu luonteenpiirteitä, jotka saattavat sopia sinuun. Merkitse jokaisen kohdalle numero, joka kuvaa, kuinka paljon olet *samaa tai eri mieltä väittämän kanssa*. Arvioi, kuinka hyvin ominaisuuspari kokonaisuudessaan sopii sinuun, vaikka toinen ominaisuuksista sopisi paremmin kuin toinen.

1 = Vahvasti eri mieltä

2 = Jokseenkin eri mieltä

3 = Hiukan eri mieltä



helppo oppia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	vaikea oppia	4
arvokas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	arvoton	5
tylsä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	innostava	6
ei kiinnostava	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	kiinnostava	7
ennalta arvaamaton	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	ennalta arvattava	8
nopea	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	hidas	9
innovatiivinen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	konventionaalinen	10
hidastava	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	tukeva	11
hyvä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	huono	12
pulmallinen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	helppo	13
ei miellytä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	miellyttää	14
tavanomainen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	uusinta uutta	15
epämiellyttävä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	miellyttävä	16
turvallinen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	turvaton	17
motivoiva	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	ei motivoiva	18
täyttää odotukset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	ei täytä odotuksia	19
tehoton	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	tehokas	20
selkeä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	sekava	21
epäkäytännöllinen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	käytännöllinen	22
järjestelmällinen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	sekava	23
houkutteleva	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	epämieluisa	24
ystävällinen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	epäystävällinen	25
konservatiivinen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	uudistava	26

### Questionnaire in Russian:

Subject: Опросный бланк исследования о мобильном приложении WordDive

### Опросный бланк исследования о мобильном приложении WordDive

Возраст: \_\_\_\_\_

Пол:

Мужской

☐

Женский

☐



привлекательный	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	непривлекательный
-----------------	-----------------------	----------------------------------	-----------------------	-----------------------	-----------------------	-----------------------	-------------------

[illegible]

